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ROSEBUD COUNTY, MONTANA
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BASELINE AND PROJECTIONS
1976-1990

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BASELINE AND PROJECTIONS
1976-1990

A Study for the Rosebud County Planning Board
June 1976

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SUMMARY

The purpose of this study is to help the people of Rosebud County deal with a future made uncertain by the prospect of large-scale energy development. Although it is clear that the coal industry will cause economic and social change, the size and magnitude of this change is not clearly defined. This study provides historical perspective on the economic and population changes which have occurred, the current picture, and projections of population under several different, potential levels of energy development in the county.

The economic and social structure of Rosebud County changed little over the period 1950-1970. In 1950 over half of the employment was concentrated in the agricultural and railroad industries; but during the 50's increased productivity in agriculture along with modernization of the railroads resulted in declining employment in both, though they still represented over 40 percent of total employment in 1960. The downward trend in these two industries continued during the 60's with a net loss of almost 50 percent in employment between 1950 and 1970. Declining employment forced people to leave the county in search of work, especially young people who were entering the labor force for the first time. Since most of the outmigrants were non-Indians, and since the Northern Cheyenne population experienced a large natural increase in population, the percentage of Rosebud County's population which was Northern Cheyenne increased from 20 percent in 1950 to 30 percent in 1970. The lack of economic growth caused by the declining employment opportunities and the low wages in the county is demonstrated by the fact that over 20 percent of the families in Rosebud County had incomes less than the national poverty level in 1970 as defined by the Census.

The 70's brought new prosperity and changes to the economic base of the county as energy development caused an influx of new people and money to the area. Temporary construction workers at the Colstrip project resulted in an 88 percent gain in the county population at the peak of construction activity in 1974. Although most of this growth was concentrated in and around Colstrip and Forsyth, some impact was also felt in the smaller communities and rural areas of the county. The current population of 9500 represents a decline of about 1800 persons since the 1974 peak.

In order to understand the process of change and to examine the connection between the economy and the population of Rosebud County this study has used a combination of "cohort-survival" demographic analysis and "economic base" analysis. This type of analysis begins by determining age, sex, and race specific birth and death rates in order to determine the

"natural increase" in the population. Attention is then focused on the economic sector where the demand for labor is related to so-called "basic" activity--activity which develops in response to factors originating outside of, or external to, the county. Given the extent and the nature of the basic activity, "nonbasic" activity is determined, and total employment reflects the sum of the two components. Discrepancies between the supply of labor and the demand for labor are assumed to induce migration and the induced migration is added to the natural increase of the population to calculate total population change.

For example, assume there is a new power plant in Wyoming that uses coal from Rosebud County. This sets into motion a series of chain reactions. Demand for the coal causes mining firms to hire additional miners and perhaps construct additional mine-related facilities which increases basic employment in the county. If there are no "unemployed" miners in the local labor force or other workers qualified to fill the new positions, inmigration of new workers to the area is likely. Whether the new jobs are filled locally or by newcomers, they increase Rosebud County's income which in turn creates demand for locally produced goods and services. This new demand leads to increased local employment in the nonbasic sectors of the economy; which, in turn, leads to further increases in local income and local consumption and the process continues.

Within this general framework, the implications of different levels and rates of energy development can be assessed by analyzing the basic employment that would accompany the different development scenarios. Since the conceivable range of activities in Rosebud County is broad, the following six different alternative future scenarios were examined in this study:

Baseline

There will be no further coal development in the county.

Alternative Future 1

Colstrip 3 and 4 will be approved and constructed but there will be no further development.

Alternative Future 2

Colstrip 3 and 4 will be built and there will be one additional power plant constructed in both the central part and the southern part of the county; three new mines along with two mine expansions are included in this alternative. Only 5 percent of the workers in the Birney-Decker area are assumed to live in Rosebud County.

Alternative Future 3

All of the activity above will occur; however, 50 percent, rather than 5 percent, of the workers in the Birney-Decker area are assumed to live in Rosebud County.

Alternative Future 4

All of the activities of AF2 will occur plus two coal mines will be developed by the Northern Cheyenne people.

Alternative Future 5

All activities of AF4 will occur along with one gasification facility in Rosebud County.

Although these alternatives represent a current estimation of possible coal developments in and around Rosebud County, they should and can be reconstructed at regular intervals as specific information about future events becomes available.

The projected population of Rosebud County implied by the baseline and the five alternative futures is presented in Table 1. The table also disaggregates the results for the principal communities of the county based on residency assumptions discussed in the text. The economic-demographic model used in this study begins each projection period with the actual age, sex, and racial population of the County as it existed in 1970. Over the period 1970 - 1976, it is possible to input actual levels of basic employment into the model and the table shows the implied population for 1970, 1975, and 1976. The performance of the model over this past period is an indication of its reliability and it is encouraging that the "projections" for 1975-76 reconcile very closely with the Special Census conducted in the County in Janurary 1976. Beginning with 1977, there are projections for each of the six different alternative assumptions about basic employment. The Table shows the results for 1980, 1985, and 1990. Projections for the intervening years and for the other areas in the County are contained in the text.

For the County as a whole, the Baseline and AF 1 project a 1990 population no larger than the current 1976 population of about 9,500. Alternative Futures 2, 3, and 4 project a 1990 population of approximately the size of the peak population experienced in 1974-75 of around 11,000. Only AF 5 would push the population substantially beyond levels associated with the construction of Colstrip Units 1 and 2.

TABLE 1

POPULATION CONSEQUENCES OF ENERGY DEVELOPMENT
ROSEBUD COUNTY AND SELECTED COMMUNITIES

Rosebud County	1970	1975	1976	1980	1985	1990	Change 1975-90
Baseline	6032	10408	9515	8207	8533	9045	-1363
AF 1				11436	9262	9594	-814
AF 2				12058	14742	10849	441
AF 3				12682	17026	11666	1258
AF 4				12547	16393	11676	1268
AF 5				11157	16393	14080	3672
Forsyth							
Baseline	1873	2558	2412	1987	1933	1931	-627
AF 1				2602	2034	1972	-586
AF 2				2712	2886	2155	-403
AF 3				2712	2886	2155	-403
AF 4				2810	3216	2320	-238
AF 5				2810	3216	2801	243
Colstrip							
Baseline	200	2808	2159	1391	1354	1352	-1456
AF 1				3887	1961	1901	-907
AF 2				4366	6379	2850	42
AF 3				4366	6379	2850	42
AF 4				4547	6990	3156	348
AF 5				4547	6990	4045	1237
Ashland							
Baseline	436	736	797	877	927	997	261
AF 1				877	927	997	261
AF 2				877	927	997	261
AF 3				877	927	997	261
AF 4				1087	1637	1353	617
AF 5				1087	1637	2387	1651

TABLE 1 (Con't)

Rosebud	1970	1975	1976	1980	1985	1990	Change 1975-90
Baseline	100	163	150	121	118	118	-45
AF 1				178	131	127	-36
AF 2				184	185	139	-24
AF 3				184	185	139	-24
AF 4				184	185	139	-24
AF 5				184	185	139	-24
Lame Deer							
Baseline	1100	1160	1176	1319	1527	1754	594
AF 1				1319	1527	1754	594
AF 2				1319	1527	1754	594
AF 3				1319	1527	1754	594
AF 4				1319	1527	1754	594
AF 5				1319	1527	1754	594

Source: Mountain West Research, Inc.

One of the surprising results of this study is the lack of substantial population growth in Forsyth. All the alternatives except AF 5 indicate a 1990 Forsyth population level lower than in 1975. The most dramatic increases are indicated for the town of Colstrip which could have around 7,000 people during the mid-1980's at the peak of construction activity and a population of from 2,500 to 4,000 by 1990 under alternatives 2 through 5. These projections do not consider limitations on community growth in the County - such as a relatively arbitrary decision to limit Colstrips population to 5,000; such a decision would greatly affect anticipated growth levels for other communities, especially Forsyth.

Less dramatic increases are projected for Ashland under the first four alternatives; however, additional growth occurs with the development of Indian Coal and the construction of a gasification facility under AF 4 and AF 5.

Rosebud County will experience population fluctuations as the result of area energy development. With careful planning, however, the various population levels will be able to be anticipated, planned for accordingly, and the substantial costs of under - or overestimating major, future public expenditures can to a large degree, be avoided.

In summary, the principal conclusions of the study are as follows:

- During the past two decades, Rosebud County has experienced a loss of population as a result of declining employment in the agricultural and railroad industries with the period between 1970 and 1975 dominated by construction activity associated with Colstrip 1 and 2.

- Without further coal development, the non-Indian population of Rosebud County should stabilize around 5,500. Forsyth will show limited growth once the construction activity at Colstrip is completed with much of the further population growth centered at Colstrip.

- The long-term impact of the construction of Colstrip 3 and 4 if it occurs, will cause an influx of approximately 500 more persons into the county with most of them locating in Colstrip. The temporary influx of persons during the construction phase of the project could cause greater problems than those experienced during the construction of units 1 and 2 since much of the excess capacity in public and private facilities in the county has now been utilized. The expected withdrawal of Western Energy from the direct management the town of Colstrip will place even greater burdens on the county's infastructure.

- Given the present level of activity in the southern part of the county, little growth is expected; however if developments result from the present exploration activity and if the road network is improved, substantial population growth could occur in this southern area.

- The demographic structure and the likely fertility behavior of the Northern Cheyenne people imply a young and rapidly growing population. There has been under-utilization of the Northern Cheyenne labor force in the past, and the rapid growth of the population will accentuate this problem. Except for limited expansion of the timber industry on the reservation, there is no sector, other than coal development, that holds promise of being able to generate enough jobs to fully utilize the Northern Cheyenne labor force.

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CHAPTER I

INTRODUCTION

Until recently, most people were not overly concerned with the consequences of growth. Rapid development of economic resources seemed expedient, and little attention was paid to the various social and environmental constraints governing growth. Emphasis was placed on initiating the growth process rather than controlling it, and the resulting social and economic consequences were accepted as a by-product of the growth process. Today, however, these attitudes have changed.

After decades of massive resource exploitation, much of our heretofore limitless supplies of natural resources have become depleted. National attention has now focused on the abundant coal reserves in the West. Fear of losing effective control of the land as a result of this new interest has fostered an attitude of conservatism toward resource use. This conservative attitude makes it essential that greater attention be placed on the economic and social issues that accompany resource development.

There is little doubt that the economic and social base of Rosebud County will undergo substantial change as a result of energy development of one sort or another. Although the need for anticipating and planning for this change is well-known, it is not clear what form the change will take; in fact, it is not clear where the county's economy is today. Numerous studies have tried to examine the question of growth; however, most have lacked the proper focus to be effective tools for local planners. The purpose of this report is to bridge this gap.

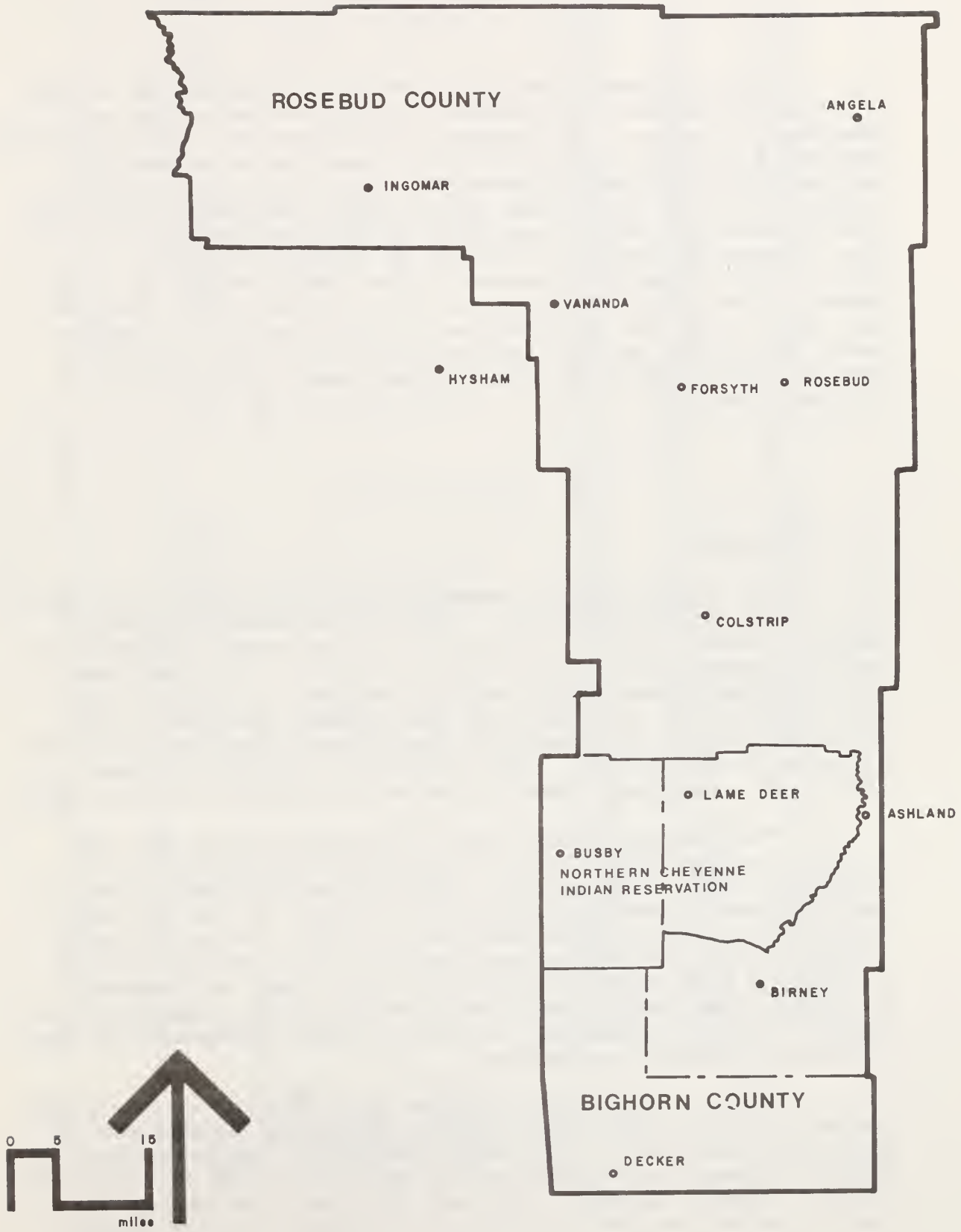
Since the purpose of this project is to provide input into the planning process of Rosebud County, the original intent was to include only the county itself in the study area. The advantages of limiting the scope of work to just Rosebud County would be that published data for the county could be used directly and that the outputs of the model could be easily interpreted. However, it became clear that this approach could lead to serious problems when projecting future levels of population and employment for the following reasons. First, since the Northern Cheyenne Reservation crosses the Big Horn-Rosebud county line, there is much interaction between the two counties in this area, and it was desirable to include in the study area that part of the reservation that is in Big Horn County. Second, the Decker area also presents a problem for analysis of the future because although presently this area is strongly

oriented to Sheridan, Wyoming, there is speculation that increased coal development activity near Birney and Decker will promote linkages between Rosebud County and the Decker area.

For these reasons the study area was expanded to include the Busby-Decker census division in Big Horn County. This area encompasses all of the Northern Cheyenne Reservation and the Decker area; and, although it includes a small and sparsely populated portion of the Crow Reservation, the small number of Indians that are not Northern Cheyenne does not appear to present a serious problem. Therefore, all of the Indians in the study area will be referred to as Northern Cheyenne. Similarly, all of the non-Indians will be referred to as Anglos. The study area is shown in Figure I-1.

Chapter II of this report gives a historical perspective of Rosebud County's economy and population and details the construction of the population, employment, and income series for the study area. Chapter III gives a brief summary of the analytic framework within which the projection analysis will be carried out and details important assumptions about various relationships used in the model. This chapter also presents the development alternatives for the basic sectors in the study area. Chapter IV analyzes the population, income, and employment implications of each of the development scenarios for the study area, for Rosebud County, and for selected communities. The final chapter summarizes the results and presents the major conclusions.

FIGURE I-1
STUDY AREA



CHAPTER II

HISTORICAL ANALYSIS

This chapter provides historical perspective on the structural changes that Rosebud County has undergone over the past 25 years. The chapter is divided into three sections: Section I deals with changes which have occurred over the period 1950-1970 and is based on census data for Rosebud County for 1950, 1960, and 1970. Major changes in the population structure and economic base will be identified with the discussion focused primarily on Rosebud County. Section II focuses on changes in the county which are indicated by data available for the years since 1970. Section III deals with the construction of the population, employment, and income series for the study area which includes Rosebud County and the Busby-Decker census division in Big Horn County.

I. 1950-1960-1970

A. POPULATION

The population of Rosebud County gradually declined during the 1950-1970 period. Table II-1 shows the population of Rosebud County, of six of its principal communities, and the percentage change for each decade. Although the first decade showed a 5.8 percent decline in total county population, only one-third of this change occurred in the six communities, and Forsyth, the largest town, showed a net increase in population. The decline in the rural areas indicates a movement from the farms and ranches in the county.

The decline slowed to 2.5 percent during the next decade, and the distribution of the population change is quite different than before. Two of the six towns--Ashland and Lame Deer--showed population increases of 250 and 800, respectively; the others declined by 219. The rural areas of the county lost 676 persons during the ten-year period, indicating more movement away from the farms and ranches. It is interesting to note that Lame Deer, the community showing the largest increase, is the principal community on the Northern Cheyenne Reservation.

Table II-2 depicts the age distribution of the population in 1950, 1960, and 1970 and shows the proportion of each age group that is Northern Cheyenne. The percentage of Northern Cheyenne for the county increased from 20.4 percent to 21.9 percent between 1950 and 1960, and the change for the following decade was from 21.4 percent to 30.3 percent.

TABLE II-1

POPULATION OF ROSEBUD COUNTY AND SIX COMMUNITIES, 1950, 1960, 1970

Area	1950	1960	% Change 1950-1960	1970	% Change 1960-1970	% Change 1950-1970
Rosebud County	6570	6187	-5.8	6032	-2.5	-8.2
Ashland	100	150	-50.0	400	166.7	300.0
Birney	50	20	-60.0	15	-25.0	-70.0
Forsyth	1906	2032	6.6	1873	-7.8	-1.7
Lame Deer	350	300	-14.3	1100	266.7	214.3
Rosebud	250	140	-44.0	100	28.6	-60.0
Ingomar	80	65	-18.7	50	-23.1	-37.5

Sources: U.S. Bureau of the Census, Census of Population: 1950: Characteristics of the Population, Montana (Washington, D.C.: U.S. Government Printing Office, 1952).

U.S. Bureau of the Census, Census of Population: 1960: Characteristics of the Population, Montana (Washington, D.C.: U.S. Government Printing Office, 1963).

U.S. Bureau of the Census, Census of Population: 1970: Characteristics of the Population, Montana (Washington, D.C.: U.S. Government Printing Office, 1973).

TABLE II-2

AGE DISTRIBUTION OF ROSEBUD COUNTY POPULATION, 1950, 1960, 1970

Age	1950		1960		1970	
	Percentage of Total Population	Percentage of Non-White Population	Percentage of Total Population	Percentage of Non-White Population	Percentage of Total Population	Percentage of Non-White Population
0- 5	12.8	17.4	13.0	18.3	10.1	17.3
5- 9	10.1	15.3	11.8	16.8	11.4	21.6
10-14	8.4	10.5	11.1	13.2	11.7	24.5
15-19	7.5	9.8	7.7	9.7	9.1	18.6
20-24	7.1	7.9	4.7	5.8	6.2	14.0
25-29	7.1	8.3	5.2	6.1	6.4	13.8
30-34	7.1	5.4	5.8	4.8	5.1	11.7
35-39	6.5	5.0	6.3	5.6	5.1	12.6
40-44	6.1	3.5	6.3	3.7	5.5	13.9
45-49	5.0	3.2	5.3	4.0	5.5	14.0
50-54	4.6	3.3	4.7	2.5	5.3	14.5
54-59	5.3	2.2	4.1	2.8	4.6	12.7
60-64	4.4	2.7	3.3	1.5	3.6	10.2
65+	7.8	5.6	10.4	5.0	10.2	30.1

Sources: U.S. Bureau of the Census, Census of Population: 1950: Characteristics of the Population, Montana (Washington, D.C.: U.S. Government Printing Office, 1952).

U.S. Bureau of the Census, Census of Population: 1960: Characteristics of the Population, Montana (Washington, D.C.: U.S. Government Printing Office, 1963).

U.S. Bureau of the Census, Census of Population: 1970: Characteristics of the Population, Montana (Washington, D.C.: U.S. Government Printing Office, 1973).

There are two reasons for this increase. First, since the fertility behavior of the Indian females is substantially higher than that of the rest of the population, the number of Indians in the young age groups increases faster than the number of non-Indians. Second, since the Northern Cheyenne people have a strong cultural tie to the area, they are more reluctant to move from the county in order to increase their economic well-being than are their Anglo counterparts. Therefore, if economic activity in the county is insufficient to support the resident population, non-Indians will migrate from the county and the Indian proportion of the remaining population will be greater. The major determinants of these trends in population are discussed in the next section.

B. EMPLOYMENT

Since 1950, the level of total employment in the county has changed little. Table II-3 shows the level and composition of employment for 1950, 1960, and 1970. As this table indicates, employment in agriculture declined 25.3 percent between 1950 and 1960 and 26.3 percent during the next decade. This must be interpreted cautiously since much of the decline simply reflects general agricultural trends toward larger and more capital-intensive operations. Nevertheless, declining agricultural employment did contribute to the decline in population in Rosebud County.

The mining sector exhibited considerable volitility in the county during the twenty-year period, declining from 108 in 1950 to 10 in 1960 and then increasing to 63 in 1970. The drop during the 1950s can be attributed to the closing of the coal mine at Colstrip in 1957, and the increase between 1960 and 1970 is due to the renewal of mining activity at Colstrip and the opening of Peabody Coal's Big Sky Mine.

Except for the decline in agriculture, the worse blow to the economy was the reduction of the railroad work force along the mainline of the old Northern Pacific and Milwaukee Road. Employment in this sector fell 61 percent between 1950 and 1970 to a level of 101.

Manufacturing employment increased substantially during this period rising from 31 in 1950 to 62 in 1960 and 174 in 1970. More than half of the increase between 1950 and 1960 occurred in the wood products industry, while most of the increase during the following decade is due to the opening of a plastic manufacturing company in Ashland. (This is probably the reason that the population in Ashland increased 300 percent between 1960 and 1970.)

TABLE II-3

EMPLOYMENT IN ROSEBUD COUNTY BY INDUSTRY, 1950, 1960, 1970

Industry	1950		1960		1970	
	Number of Persons Employed	Percentage of Total	Number of Persons Employed	Percentage of Total	Number of Persons Employed	Percentage of Total
Agriculture	928	41.9	693	32.7	511	22.8
Mining	108	4.9	10	.5	63	2.8
Construction	109	4.9	69	3.2	117	5.2
Manufacturing	31	1.4	62	2.9	174	7.8
Railroad	257	11.6	173	8.2	101	4.5
Other Transportation, Communication, and Public Utilities	42	1.9	62	2.9	50	2.2
Trade	271	12.2	364	17.2	315	14.1
Finance, Insurance, Real Estate	24	1.1	26	1.2	53	2.4
Services	160	7.2	240	11.3	208	9.3
Education and Public Administration	222	10.0	271	12.8	419	18.7
Other	62	2.8	148	7.0	227	10.1
TOTAL	2214	100.0	2118	100.0	2238	100.0

Sources: U.S. Bureau of the Census, Census of Population: 1950: Characteristics of the Population, Montana (Washington, D.C.: U.S. Government Printing Office, 1952).

U.S. Bureau of the Census, Census of Population: 1960: Characteristics of the Population, Montana (Washington, D.C.: U.S. Government Printing Office, 1963).

U.S. Bureau of the Census, Census of Population: 1970: Characteristics of the Population, Montana (Washington, D.C.: U.S. Government Printing Office, 1973).

The large increase in education and public administration employment can be attributed to the rising level of government activities in the county. Government employment in education accounted for much of this change.

The remaining sectors offset most of the losses incurred by the other industries, growing by 294 employees between 1950 and 1970. Most of this increase occurred between 1950 and 1960. In fact, the trade sector and the service sector showed large increases in employment between 1950 and 1960; however, both declined in 1970. Although these sectors increased employment substantially during this period, the increases must be interpreted carefully. Since hourly earnings in these sectors are low and employment is often on a part-time basis, it is questionable whether the number of full-time equivalents actually increased.

C. INCOME

The stagnant nature of activity in the county is also reflected in the income data presented in Table II-4. (It should be emphasized that these figures are not adjusted for inflation.) As a point of reference, Rosebud County's contribution to total personal income in Montana is also shown in Table II-4, which indicates that the county's economic position relative to the state has been slowly deteriorating.

TABLE II-4

PERSONAL INCOME FOR ROSEBUD COUNTY AND THE STATE OF MONTANA, 1950, 1959, 1970

	1950	1959	1970
Montana	962.0	1345.0	2442.0
Rosebud County	10.0	12.7	20.8
Percentage of Montana	1.0	.9	.8
		Income per Capita	
Montana	1622.0	2010.0	3517.0
Rosebud County	1510.0	2077.0	3448.0
Rosebud/Montana	.93	1.03	.98

Source: U.S. Department of Commerce, Bureau of Economic Analysis, unpublished data.

A second measure which may shed some light on the general economic well-being of the people of the county is the median family income given in Table II-5. This gives the income level for which there is an equal number of families below and above. All three years show that Rosebud County's family income level was much lower than the state average. This is further emphasized by the fact that in 1970, 20 percent of all families and 25.8 percent of all persons in Rosebud County had income less than the poverty level as defined by the Bureau of the Census. The poverty level is different for families of different sizes. Furthermore, 14.6 percent of families and 18.8 percent of all persons in the county had incomes

TABLE II-5

MEDIAN FAMILY INCOME FOR ROSEBUD COUNTY AND THE STATE OF MONTANA, 1950, 1960, 1970

	1950	1960	1970
Rosebud County	2524	4399	6717
Montana	3292	5403	8512
Rosebud/Montana	.767	.814	.789

Sources: U.S. Bureau of the Census, Census of Population: 1950: Characteristics of the Population, Montana (Washington, D.C.: U.S. Government Printing Office, 1952).

U.S. Bureau of the Census, Census of Population: 1960: Characteristics of the Population, Montana (Washington, D.C.: U.S. Government Printing Office, 1963).

U.S. Bureau of the Census, Census of Population: 1970: Characteristics of the Population, Montana (Washington, D.C.: U.S. Government Printing Office, 1973).

less than 75 percent of the poverty level. This compares to figures of 10.4 percent for families and 13.6 percent of persons in Montana below the poverty level and 6.4 percent of families and 8.5 percent of individuals below 75 percent of the poverty level. Table II-6 documents these values.

TABLE II-6

POVERTY LEVEL OF POPULATION, ROSEBUD COUNTY AND THE STATE OF MONTANA, 1970

	Rosebud County	Montana
Percentage of families below poverty level	20.0	10.4
Percentage of persons below poverty level	25.8	13.6
Percentage of families below 75 percent of poverty level	14.6	6.4
Percentage of persons below 75 percent of poverty level	18.8	8.5

Source: U.S. Bureau of the Census, Census of Population: 1970: Characteristics of the Population, Montana (Washington, D.C.: U.S. Government Printing Office, 1973).

Once again this reflects the depressed economic conditions of the area and emphasizes the need to look at measures other than employment. Even though total employment increased between 1960 and 1970, personal income and income per capita fell relative to the state as a whole due to a shift in employment to low-paying jobs. It should be pointed out that this was also a time when Montana's income relative to the United States as a whole was deteriorating.

II. 1970-1973

Although the census data give a detailed picture of population, employment, and income in Rosebud County, they do not show what has happened since 1970. The best data source for this annual data is the Bureau of Economic Analysis (BEA) of the Department of Commerce which gives both income and employment series broken down into ten groups. A further breakdown into about 70 sectors is also provided, but it cannot be released without approval of the Employment Security Division.

Despite the fact that these data are helpful, there are definitional differences between the Census and the BEA series. These differences and the adjustments necessary to compensate for them are examined in detail in the last part of the section. Here it is sufficient to note that the Census counts the number of persons working while the BEA, on the other hand, counts the number of jobs. For example, if a person has two jobs, employment will be recorded by the Census as 1 (employed person) but by BEA as 2 (jobs). Because of the time involved in compiling the BEA data, the annual series is presently only available through 1973.

A. POPULATION

The 1970 Census and the Special Census completed in January of 1976 give solid population numbers, but precise numbers are not available for the years between 1970 and the present. The Bureau of the Census does publish estimates of the county's population for these interim years, and these are presented in Table II-7. The estimates indicate a gradual increase from 1970 to 1972 and a larger increase from 1972 to 1974. The 1974 estimates seem especially low in light of the January 1976 Special Census count.

The interim year population figures can be helpful if they are used with care. The estimates are derived by using an allocation method that is of questionable precision when used for counties experiencing rapid growth. The Bureau of the Census allocates a part of its national estimate to Montana, which is referred to as the control total. The Bureau of Business and Economic Research at the University of Montana then uses various indicators, from a group provided by the Census, to determine how the state population is to be allocated to the 56 counties. The allocation procedure uses such data as births, deaths, vehicle registrations, utility connections, etc.

TABLE II-7

POPULATION OF ROSEBUD COUNTY, 1970-1976

Year	Number	Percentage Change
1970[a]	6032	-
1971	6100	1.1
1972	6300	3.3
1973	6900	9.5
1974	7700	11.6
1976[b]	9578	24.4
Change between 1970-1976	3543	58.7

[a]Census of the Population, 1970.

[b]Special Census, January 23, 1976.

Sources: U.S. Bureau of the Census, Census of Population: 1970: Characteristics of the Population, Montana (Washington, D.C.: U.S. Government Printing Office, 1973).

U.S. Bureau of the Census, "Population Estimates and Projections," Current Population Reports, Series P-26 (Washington, D.C., U.S. Government Printing Office, various issues).

U.S. Bureau of the Census, Special Census, unpublished data.

There are two possible sources of error in this procedure. First, if the state control total is too low, the county's population probably is also likely to be understated. Second, the Rosebud County figures are likely to be affected by an error caused by the variables that are chosen to be used in the allocation process. The construction of Colstrip 1 and 2 has been a major reason for population increase in the county; however, many of these persons will be in the county for only one or two years, and the more transient residents may not be adequately reflected in the allocation variables, causing underestimation of the population. In

any case, the January 1976 Census count indicates that the population of the county has been underestimated at least for 1973 and 1974.

B. EMPLOYMENT

Employment for each of the ten sectors for 1970 to 1973 is shown in Table II-8. Total employment increased 28.3 percent during this period. Mining and construction employment led the way showing 533 percent and 162 percent increases, respectively. Agricultural employment remained nearly constant.

TABLE II-8

EMPLOYMENT BY SECTOR IN ROSEBUD COUNTY, 1970-1973

Sector	1970	1971	1972	1973
Agriculture[a]	697	714	709	701
Mining	42	79	103	266
Construction	29	25	39	76
Manufacturing	213	229	264	191
Transportation, Communication, Public Utilities	184	181	187	190
Trade	216	242	267	330
Finance, Insurance, Real Estate	19	26	37	42
Services	395	514	562	645
Government	442	462	474	491
Other[a]	309	320	334	334
TOTAL	2546	2792	2976	3266

[a]Includes self-employed proprietors.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, unpublished data.

Manufacturing, which fell by 22 employees from 1970 to 1973, was the only other basic sector that experienced change. This sector declined by 73 from 1972 to 1973. Some of this was a result of the fire at the Eastmont Lumber Company, and much of the rest is attributable to the reduction of 62 in the work force of Guild Arts and Crafts; both companies are located in Ashland.

One of the largest gains in employment occurred in the service sector, and this is reflected in the percentage of total employment in services indicated in Table II-9. Most of the change was the result of an increase in welfare and non-profit groups on or near the Northern Cheyenne Reservation. This included the St. Labre School and other religious and social service groups.

Although it is clear that employment has increased substantially since 1970, it is not clear that the county residents have enjoyed a similar increase in their level of welfare. Since employment is not a complete indicator, the income associated with the employment must also be examined.

C. INCOME

Unlike the Census, the BEA also has an income series broken down into industrial sectors. Income for the ten sectors is given in Table II-10. (These values have not been adjusted for inflation.) Table II-11 converts these total income values to dollars of income per employee. The income per employee, or annual wage, gives some indication of the wide variance between sectors and of the importance of agricultural income in determining the overall income of the county. When compared to the similar state total, the average wage in Rosebud County rises from 93 percent of the state average in 1970 to 104 percent in 1973. However, if agriculture is not included in the total, the county average wage remains below the state average. The increase in 1973 can be attributed to the increased activity in the mining and construction sectors. The difference between the total and non-agriculture values emphasizes the continued importance of agriculture in Rosebud County.

D. RECONCILIATION OF CENSUS AND BEA DATA

As mentioned before, the Census and the BEA data series differ in a number of ways. First, the BEA counts the number of jobs in the county; thus, if a person has two jobs, he counts as two in the BEA series. The Census,

TABLE II-9

DISTRIBUTION OF EMPLOYMENT IN ROSEBUD COUNTY, 1970-1973
(given as percentage of total employment)

Sector	1970	1971	1972	1973
Agriculture[a]	27.4	25.6	23.8	21.5
Mining	1.6	2.8	3.5	8.1
Construction	1.1	.9	1.3	2.3
Manufacturing	8.4	8.2	8.9	5.8
Transportation, Communication, Public Utilities	7.2	6.5	6.3	5.8
Trade	8.5	8.7	9.0	10.1
Finance, Insurance, Real Estate	.7	.9	1.2	1.3
Services	15.5	18.4	18.9	19.7
Government	18.4	16.5	15.9	15.0
Other[a]	12.1	11.5	11.2	10.2
TOTAL	100.0	100.0	100.0	100.0

[a]Includes self-employed proprietors.

Source: Derived.

on the other hand, counts the number of persons working; therefore, the person who has two jobs would only be counted as one employed person.

A second difference is that the Census counts the employed person in the county in which he resides; the BEA counts the person in the county in which he works. For example, if a construction worker lives in Big Horn County and works in Rosebud County, the Census will count him as

TABLE II-10

LABOR INCOME BY SECTOR IN ROSEBUD COUNTY, 1970-1973
(thousands of current dollars)

Sector	1970	1971	1972	1973
Agriculture[a]	5766	6036	7972	11985
Mining	555	807	1104	3620
Construction	232	129	302	790
Manufacturing	935	1102	1126	917
Transportation, Communication, Public Utilities	1574	1649	1827	2077
Trade	715	825	928	1185
Finance, Insurance, Real Estate	88	132	193	235
Services	1539	1916	2347	2641
Government	2481	2835	3093	3478
Other[a]	1249	1193	1196	1258
TOTAL	15134	16624	20088	28186

[a]Includes self-employed proprietors.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, unpublished data.

TABLE II-11

INCOME PER EMPLOYEE, ROSEBUD COUNTY, 1970-1973
(current dollars)

	1970	1971	1972	1973
Agriculture	8272	8454	11244	17097
Mining	13214	10215	10718	13609
Construction	8000	5160	7743	10394
Manufacturing	4389	4812	4265	4801
Transportation, Communication, Public Utilities	8554	9110	9770	10931
Trade	3310	3409	3476	3590
Finance, Insurance Real Estate	4631	5077	5216	5595
Services	3896	3728	4176	4094
Government	5613	6136	6525	7083
Other	4042	3728	3581	3766
Rosebud Total	5944	5954	6750	8630
Rosebud Non-Ag Total	5066	5095	5344	6316
Montana Total	6378	6432	7359	8325
Montana Non-Ag Total	6093	6717	6743	7124
Rosebud/Montana				
Total	.93	.92	.92	1.04
Non-Agriculture	.83	.76	.79	.89

Source: Derived.

employed in Big Horn County, and the BEA will count him in the Rosebud County employment total.

The third major difference between the two data series is in the definition of government workers and self-employed proprietors. The Census counts the person as an employee in the industry in which he is primarily engaged. Therefore, a state highway department employee who works on a highway construction crew will be counted in the construction sector even though he is employed by the state government. The BEA, on the other hand, will count the same person in the government sector. If a person owns a grocery store, he will be counted as a trade sector employee by the Census but as a non-farm proprietor under the BEA series.

If the analysis was only concerned with Rosebud County's population and employment in 1970, the differences described above would cause no problem since we could safely ignore the BEA series. However, the immediate nature of a planning program makes it essential that the most current information be used to examine the position of the county today and the course it may take in the future. The events that have taken place since 1970 will influence the events expected to happen during the next five years. Therefore, it is best to use the 1970 Census as a base for the population and labor force relationships and use the annual, and more current, BEA data for the employment series. In order to combine the Census and the BEA sources, certain adjustments must be made to make the two consistent.

To summarize, the advantages of the BEA series are as follows:

--The number of jobs rather than the number of employed persons is more closely related to income generated.

--The BEA series is available annually from 1970 to 1973.

--The BEA series identifies government employment.

--The same source generates both employment and income data.

The major problems in using the BEA series are:

--Non-farm proprietors are not allocated to industrial sectors.

--The primary data source is the Employment Security Division's unemployment insurance reports, and jobs are sometimes mistakenly attributed to the firm's headquarters. (For example, if a Billings contractor builds homes in Forsyth, the jobs may be recorded in Yellowstone County.)

--The number of jobs in the county may not be equal to the number of jobs available to the residents of the county because of commuting.

Table II-12 shows 1970 employment by sector for both the BEA series and the Census series. The table also indicates the percentage difference between the BEA and Census series. Since the Census allocates the non-farm proprietors to each sector, it has no employment in the "other" category. It is quite evident that any attempt to reconcile each sector individually would be futile. Both the government and self-employed categories would have to be removed from each census sector; however, there is no information on which to base this adjustment.

From a projections viewpoint, it is critical that the BEA employment total be consistent with the population total for the county in 1970. To check for this consistency, the following method was used and is illustrated in Table II-13. The BEA total employment was first adjusted for commutation. The source and number of commuters is presented in Table II-14. This shows that there were 203 persons working in Rosebud County but living elsewhere in 1970. Since these people are not included in the county's population, they will be subtracted from the BEA total.

The second adjustment necessary was to account for persons holding more than one job. National averages had to be used for this since no state or county specific data are available. Overall, 5.8 percent of employed males and 2.6 percent of employed females held more than one job. Assuming that most of the people held no more than two jobs, the number of extra jobs in Rosebud County was estimated by multiplying the number of males and females employed by 5.8 percent and 2.6 percent, respectively, giving a total number of 104. This number was then subtracted from the BEA total. The BEA total is now defined in a manner that corresponds to the Census figures; that is, by the number of persons employed who reside in the county. As illustrated in Table II-12, the Census total and the BEA adjusted total are quite close. This implies that the BEA series can be used for the employment base provided it is adjusted for definitional differences.

TABLE II-12

CENSUS v. BEA EMPLOYMENT FIGURES

Sector	BEA	Census	Percentage Difference
Agriculture	697	511	-26.7
Mining	42	63	50.0
Construction	29	117	303.4
Manufacturing	213	174	-18.3
Transportation, Communication, Public Utilities	184	151	-17.9
Trade	216	315	45.8
Finance, Insurance, Real Estate	19	53	178.9
Services	395	237	-40.0
Government	442	617	39.6
Other	309	-	NA
TOTAL	2546	2238	-12.1

Sources: U.S. Bureau of the Census, Census of Population: 1970: Characteristics of the Population, Montana (Washington, D.C.: U.S. Government Printing Office, 1973).

U.S. Department of Commerce, Bureau of Economic Analysis, unpublished data.

Reconciliation of the Census and the BEA income series is more difficult. Total income from the Census was $13,428,000 for 1969. The 1969 BEA personal income for Rosebud County was $17,772,000, or a difference of 32 percent. Once again, the discrepancy is due to definitional differences between the Census and the BEA. The BEA income series includes such income as income "in kind," income of non-profit organizations, the value of services of banks

TABLE II-13

ADJUSTMENT OF BEA DATA

Total unadjusted employment	2546
Commutation adjustment	-203
Employment adjusted for commutation	2343
Male multiple-job holding adjustment	-83
Female multiple-job holding adjustment	-21
Total employment adjusted	2239
Census employment	2238

Source: Derived.

TABLE II-14

COMMUTING FLOWS IN ROSEBUD COUNTY

Source	In-Commuters (to Rosebud)	Out-Commuters (from Rosebud)	Net Commuters (in and out)
Big Horn	82	0	82
Custer	42	15	27
Dawson	16	0	16
Fergus	7	0	7
Garfield	10	7	3
Musselshell	8	0	8
Petroleum	5	0	5
Powder River	17	9	8
Treasure	13	0	13
Valley	13	0	13
Yellowstone	28	7	21
TOTAL	241	38	203

Source: U.S. Department of Commerce, Bureau of Economic Analysis, unpublished data.

and other financial firms rendered to persons without charge, and Medicare payments. These items are not included by the Census. Moreover, the Census data are obtained directly from households while the BEA series is estimated largely on the basis of data from the administrative records of business and governmental sources.

III. STUDY AREA DATA

As pointed out in the introductory chapter, the analysis must include the Busby-Decker census division in Big Horn County. This necessitates that series be developed for population, employment, and income for the study area. The method used to obtain each is described below.

A. POPULATION

The 1970 population for the study area was easy to construct. A tabulation of the population by age, sex, and race in the Busby-Decker area was obtained, and the population in each group was added to the 1970 population of Rosebud County. The results are shown in Table II-15. The Busby-Decker addition added approximately 1000 persons to the study area's population, and the Northern Cheyenne accounted for 60 percent of this increase. The population figures are shown in Figure II-1 which presents the differences between the age distribution of the Northern Cheyenne and the Anglos. Both groups are relatively close in the young age cohorts with the Northern Cheyenne having more children under the age of five. One of the more striking features of this distribution is the small proportion of the Indian population in the older age groups and the correspondingly large proportion of children who will be coming into the labor force in the next five to fifteen years. The Cheyenne distribution also lacks the bulge in the middle-age groups seen in the non-Indian distribution. Although more recent population estimates for the study area as a whole are not available, the Rosebud County estimates can be used to proxy the total. The only activity in the Busby-Decker part of the study area has been the Decker mine, and most of the population influx has been in Wyoming rather than in Montana.

B. EMPLOYMENT

The employment series for the study area was somewhat more difficult to construct as the only data available for the Busby-Decker division were from the 1970 Census, and these could not be directly added to the BEA 1970 employment series due to the differences in definition. For

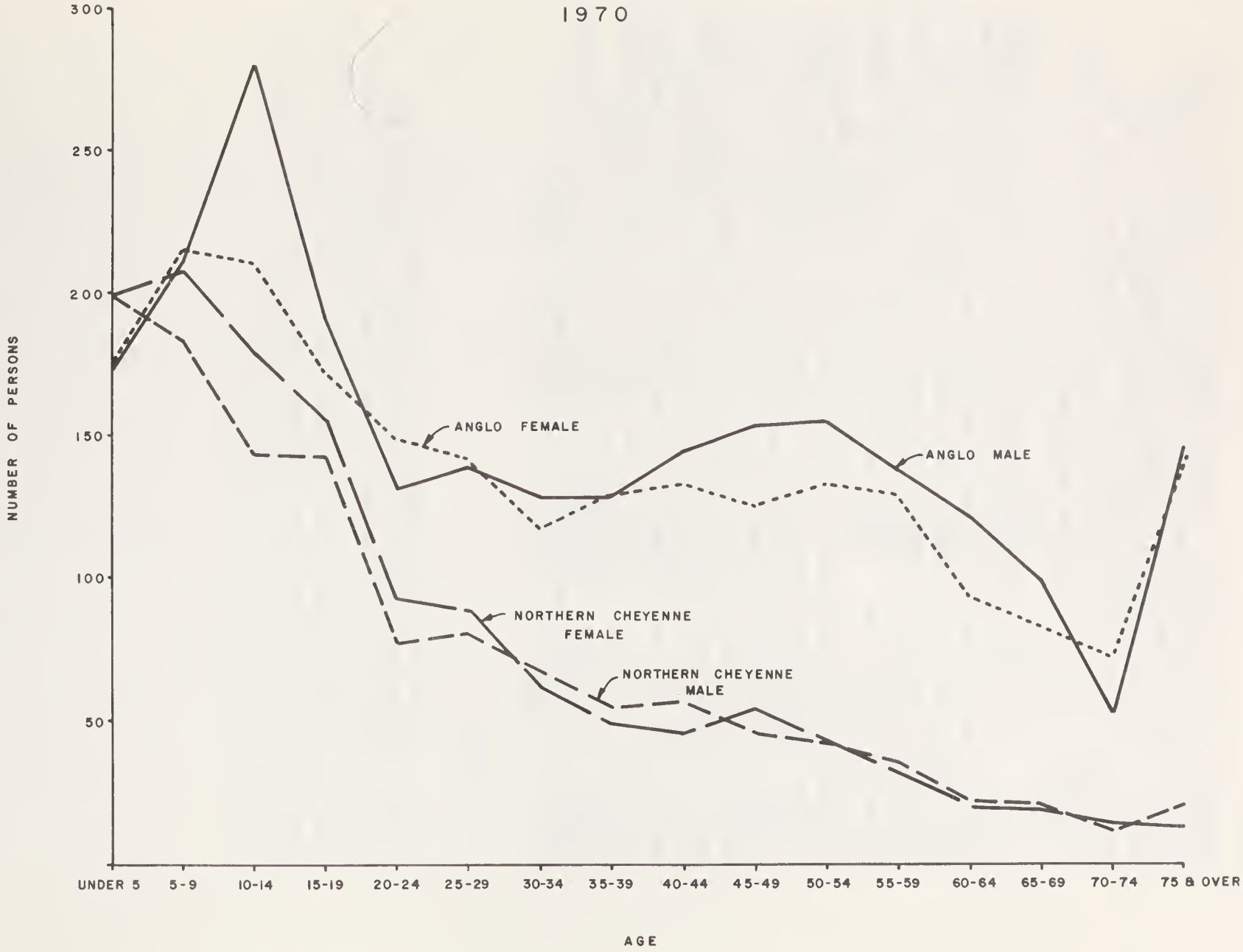
TABLE II-15

STUDY AREA POPULATION BY RACE, SEX, AGE

	Anglo		Indian		Total	
Age	Male	Female	Male	Female	Male	Female
5	172	174	199	199	371	373
5- 9	213	218	184	207	397	425
10-14	280	210	144	178	424	388
15-19	192	171	143	154	335	325
20-24	132	149	77	93	209	242
25-29	141	142	80	89	221	231
30-34	128	117	69	60	197	177
35-39	128	129	55	49	183	178
40-44	145	135	56	46	201	181
45-49	153	125	46	53	199	178
50-54	154	136	41	42	195	178
55-59	137	129	36	33	173	162
60-64	122	94	22	19	144	113
65-69	96	84	21	20	117	104
70-74	52	71	9	12	61	83
75+	145	140	16	11	161	151
TOTAL	2390	2224	1198	1265	3588	3489

Source: U.S. Bureau of the Census, unpublished summary tape data.

FIGURE II-1
DISTRIBUTION OF THE POPULATION
STUDY AREA
1970



Source: U.S. Bureau of the Census, Unpublished Summary Tape Data.

example, if ten people lived in Busby but worked in Lame Deer, they would be counted as employed in Big Horn County by the Census but would already be included in the BEA data. The ten workers would be double counted if they were just added to the BEA totals. Therefore, each sector had to be examined to determine whether there was any substantial commuting by its employees.

Using BEA and Census data for Big Horn and Rosebud Counties, as well as the commuting data presented in Table II-14, the following assumptions were made. According to the commuting flow table, there were 82 people living in Big Horn County and working in Rosebud County. All of the agricultural workers were assumed to work in the county in which they live. There were no miners, trade, or "other" workers in the area. The 13 construction workers were assumed to be involved in the Decker mine and to be living in Sheridan; therefore, they were added to Rosebud County's total. Twenty-two of the 61 manufacturing workers were assumed to work in Rosebud County; therefore, only 39 were added to the BEA series. This left sixty commuters. It was assumed that these people worked in the government; thus, only 52 of 112 government workers from the Census series were added to the BEA series. Except for the Decker mine, no change in activity has occurred in the Busby-Decker area, and therefore the additions were kept constant for the period 1970-1973. The Decker mine activity can be omitted since most of its workers live in Wyoming. Table II-16 shows the employment series for the study area.

C. INCOME

Given the employment series in Table II-16, the income series was constructed as follows. The average income by sector for Rosebud County was calculated for the period 1970-1973; these wages were then applied to the corresponding employment for a given year. For example, if the wage was $10,000 per year and employment was 50, income generated by that sector would be $500,000. The results of this process are shown in Table II-17.

TABLE II-16

STUDY AREA EMPLOYMENT, 1970-1973

Sector	1970	1971	1972	1973
Agriculture	851	868	863	855
Mining	42	79	103	266
Construction	29	25	39	76
Manufacturing	252	268	303	230
Transportation, Communication, Public Utilities	201	198	204	207
Trade	233	259	284	347
Finance, Insurance, Real Estate	19	26	37	42
Services	406	525	573	656
Government	494	514	526	543
Other	315	325	340	339
TOTAL	2842	3087	3272	3561

Source: Derived.

TABLE II-17

STUDY AREA INCOME BY SECTOR, 1970-1973
(thousands of current dollars)

Sector	1970	1971	1972	1973
Agriculture	7148	7378	9838	14748
Mining	555	807	1104	3618
Construction	232	129	302	790
Manufacturing	1109	1286	1303	1104
Transportation, Communication, Public Utilities	1708	1802	1999	2256
Trade	769	880	994	1249
Finance, Insurance, Real Estate	88	132	193	235
Services	1583	1942	2407	2690
Government	2766	3135	3419	3855
Other	1249	1193	1196	1258
TOTAL	17207	18684	22755	31803

Source: Derived.

CHAPTER III

ANALYTIC FRAMEWORK

The social and economic assessment process depends on an assumed set of relationships among the various demographic and economic variables in the area under investigation. The assumed set of relationships is often referred to as a model; because much of what comes out of the analysis is a direct consequence of the assumed structure of the model, it is important that the model used in this study be briefly explained and that the critical assumptions on which it is based be identified.

I. THE MODEL

The economic-demographic simulation model provides a framework within which the interaction of the demographic structure and the economic base of the study can be studied. The components of the model and the purposes they serve are as follows:

--Demographic Submodel: This submodel starts with a base population of the study area and predicts the number who are expected to be born and die during the year. Part of the new population then joins the labor force based on a set of assumed age-sex-race specific labor force participation rates. The output of this submodel includes population and labor force.

--Economic Submodel: The economic submodel begins with the assumptions about the level of basic activity in the area and generates the total employment and real income levels by industry.

--Racial Allocation of Employment Submodel: The available Northern Cheyenne labor force is compared to the total number of jobs assumed to be available to the Cheyenne. The proportion of new jobs in a given industry that will be available to the Cheyenne is referred to as the Northern Cheyenne "entry factor" and was estimated to reflect both the historical level of participation of the Cheyenne in the industry and an estimate of the way in which this might change in the future. Northern Cheyenne employment is then determined by whichever factor

becomes limiting first--available labor force or available jobs. Possible Anglo employment by industry is then calculated by subtracting the Indian employment from the total.

--Migration Submodel: The Anglo total employment is then compared to the available Anglo labor force from the demographic submodel and the implied unemployment rate is calculated. If this rate is outside the normal range, migration is assumed to occur to bring the rate within the range. The in-migrants (out-migrants) are then added (subtracted) to the base population, and the model proceeds to the next year.

The model generates five basic tables:

(1) Population--Age, Sex, Race

(2) Labor Force--Age, Sex, Race

(3) Employment--Race, Industry

(4) Unemployment Rate--Race

(5) Labor Income--Race

The interrelationships of the four submodels and more detail about the way in which their components interact are shown in Figure III-1.

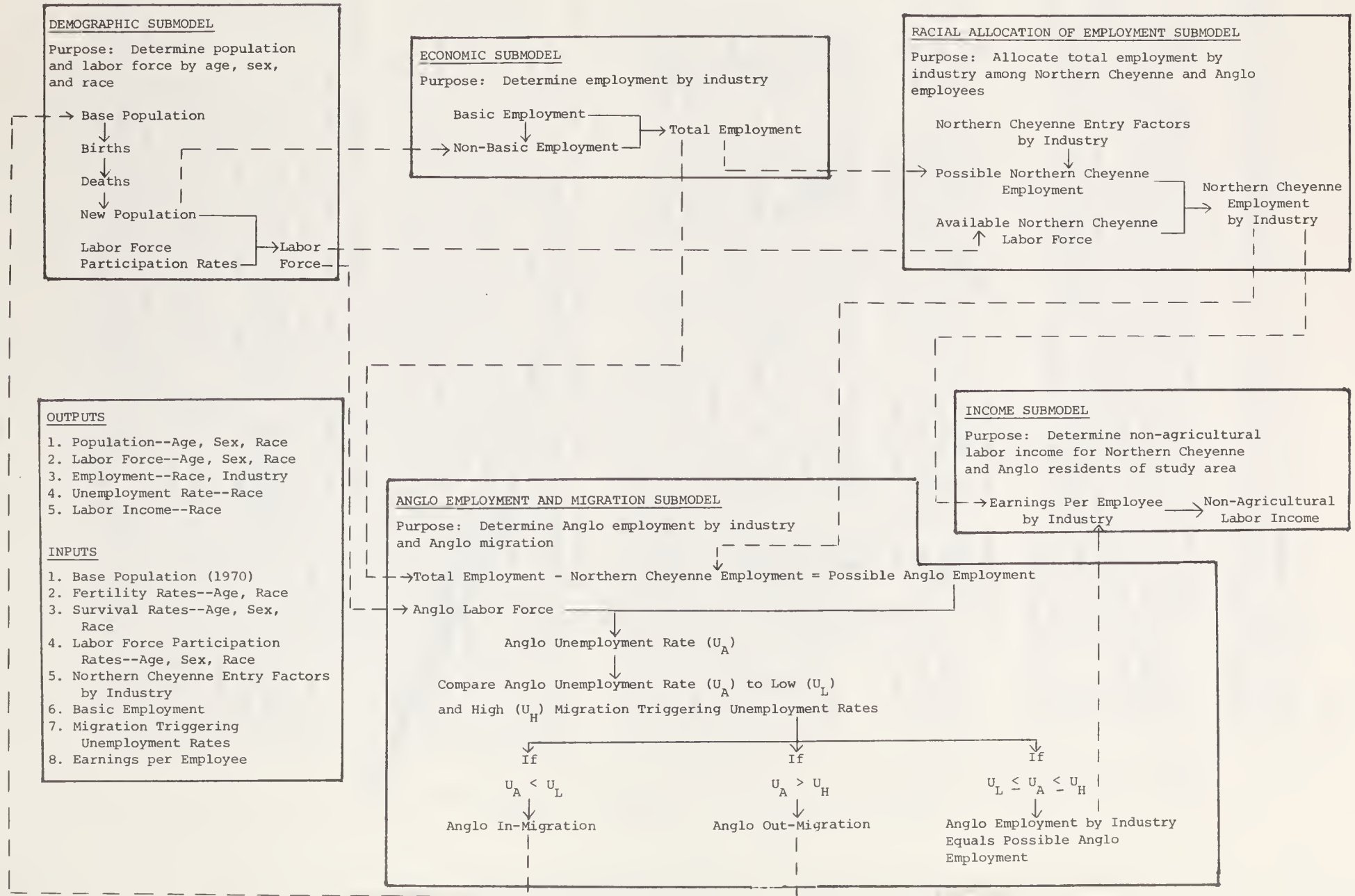
II. IMPORTANT DEMOGRAPHIC ASSUMPTIONS

As will be seen below, the vital rates (both birth and death) of the population and the labor force participation rates of the area residents are important factors in determining the impact on the study area of resource development.

Fertility rates were derived by taking the annual average number of live births over the period 1969-1971 by age and race of mother for the state of Montana and then calculating rates based on the 1970 Census population. These rates were then examined further to check their applicability to the study area. Data provided by the Indian Health Service showed that fertility rates for the service unit containing the Northern Cheyenne Reservation are close to Montana all-Indian rates. These data also indicated that although there was a substantial decrease in the rates between 1960 and 1970 (from 246.8/1000 to

FIGURE III-1

ROSEBUD COUNTY ECONOMIC-DEMOGRAPHIC SIMULATION MODEL


DEMOGRAPHIC SUBMODEL
Purpose: Determine population and labor force by age, sex, and race
Base Population
Births
Deaths
New Population
Labor Force Participation Rates
Labor Force
ECONOMIC SUBMODEL
Purpose: Determine employment by industry
Basic Employment
Non-Basic Employment
Total Employment
RACIAL ALLOCATION OF EMPLOYMENT SUBMODEL
Purpose: Allocate total employment by industry among Northern Cheyenne and Anglo employees
Northern Cheyenne Entry Factors by Industry
Possible Northern Cheyenne Employment
Available Northern Cheyenne Labor Force
Northern Cheyenne Employment by Industry
OUTPUTS
1. Population--Age, Sex, Race
2. Labor Force--Age, Sex, Race
3. Employment--Race, Industry
4. Unemployment Rate--Race
5. Labor Income--Race
INPUTS
1. Base Population (1970)
2. Fertility Rates--Age, Race
3. Survival Rates--Age, Sex, Race
4. Labor Force Participation Rates--Age, Sex, Race
5. Northern Cheyenne Entry Factors by Industry
6. Basic Employment
7. Migration Triggering Unemployment Rates
8. Earnings per Employee
INCOME SUBMODEL
Purpose: Determine non-agricultural labor income for Northern Cheyenne and Anglo residents of study area
Earnings Per Employee by Industry
Non-Agricultural Labor Income
ANGLO EMPLOYMENT AND MIGRATION SUBMODEL
Purpose: Determine Anglo employment by industry and Anglo migration
Total Employment - Northern Cheyenne Employment = Possible Anglo Employment
Anglo Labor Force
Anglo Unemployment Rate (U_A)
Compare Anglo Unemployment Rate (U_A) to Low (U_L) and High (U_H) Migration Triggering Unemployment Rates
If $U_A < U_L$
Anglo In-Migration
If $U_A > U_H$
Anglo Out-Migration
If $U_L \leq U_A \leq U_H$
Anglo Employment by Industry Equals Possible Anglo Employment

186.1/1000 women of childbearing age), there is no evidence that there will be a decline of this magnitude over the decade of the 1970s.

This, along with the importance of large families to the Northern Cheyenne, leads to the assumption that future fertility rates will remain at the 1970 level. Although the rates could fall in the future, such a reduction would not significantly affect the size of the Indian labor force until after 1990. The reduction, however, would cause the Northern Cheyenne population to be smaller than projected.

Survival rates were obtained in much the same manner. Average annual deaths by age, sex, and race for the period 1969-1971 were divided by the 1970 Census population in each age-sex-race group. These rates were assumed to remain constant at the 1970 level.

The most important demographic assumptions are those that relate to how the resident population will participate in the labor force. This concept is referred to as the labor force participation rate (LFPR) and is a measure of the number of employed and unemployed persons seeking work expressed as a percentage of the population of working age. If, for example, there were 80 persons of a given race, sex, and age, and 50 of these were employed and 10 were unemployed but seeking work, then the number in the labor force would be 60. The LFPR for this particular cohort would be 60/80 or .75.

In general, the higher the LFPR, the smaller the population necessary to fill a given number of jobs. This results in a higher level of per capita income, since the ratio of employed persons to total population is higher. In order to do any analysis of the impact of future events, it is necessary to look carefully at the LFPR of both the Anglo and Northern Cheyenne residents in the study area. The Indian and Anglo LFPR along with the U.S. rates are graphed in Figure III-2 and Figure III-3.

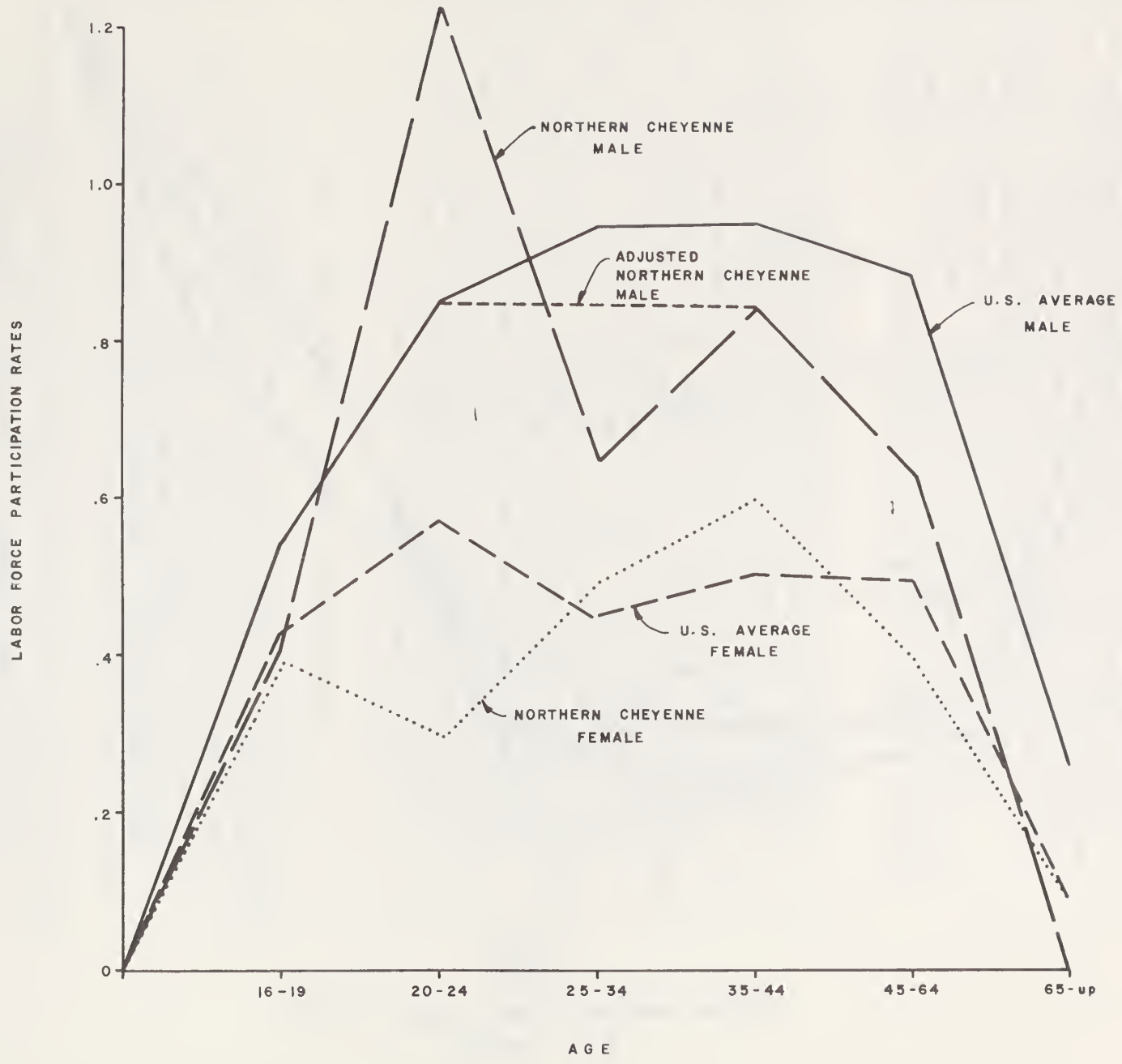
The rate for 20-24 year old male Northern Cheyennes was calculated to be greater than one, which means that there are more males of this age in the labor force than there are total males of this age. Clearly, this is not reasonable. Furthermore, the rate for 25-34 year old males seemed to be too low. Therefore, the 20-24 and 25-34 year old Northern Cheyenne males were combined with the resulting LFPR indicated by the light, dotted line in Figure III-2. The same results were observed for the Anglo males with both the 20-24 and 35-44 rate greater than one and the 25-34 rates too low. These three age groups were combined with the LFPR indicated in a like manner in Figure III-3.

FIGURE III-2

LABOR FORCE PARTICIPATION RATES

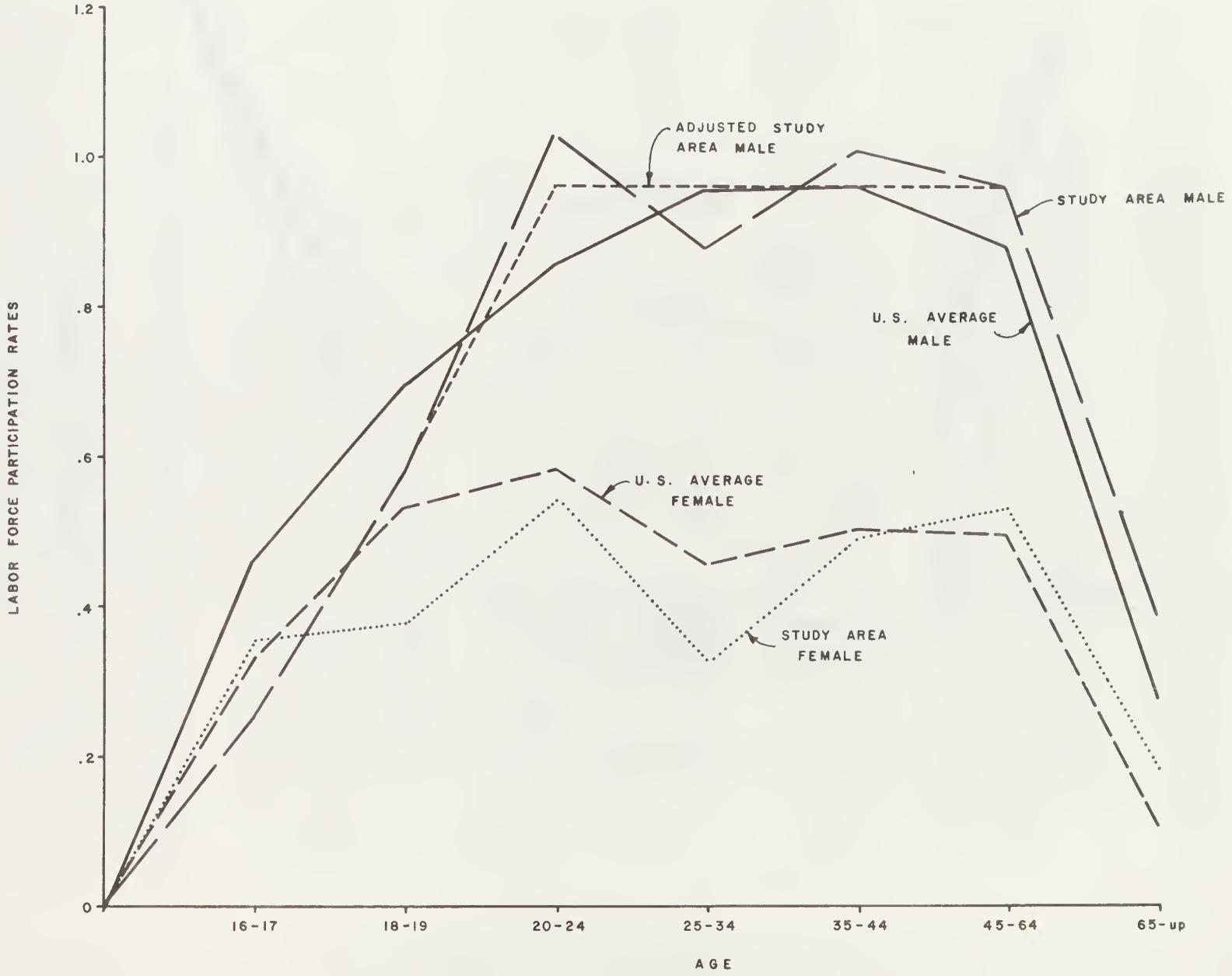
NORTHERN CHEYENNE

1970



Sources: Derived from U.S. Bureau of the Census, Summary Tape Data.

FIGURE III-3
LABOR FORCE PARTICIPATION RATES
ANGLO
1970



The pattern of participation for Northern Cheyenne males and females is somewhat below the average participation for the United States as a whole. Likewise, labor force participation for Anglo women in the study area is below that for U.S. women. It is well known that persons drop out of the labor force (i.e., no longer "actively" seek work) if, over an extended time, they fail to find employment. However, these discouraged labor force participants may rejoin the labor force if employment opportunities become available in the area. As coal development activity increases in the study area, it would be unrealistic to assume that the LFPR will remain at the 1970 level.

For this reason, the futures analysis has been done under two different assumptions about labor force participation behavior. The first assumption, referred to as LFPR1, is that the LFPR will remain at the 1970 level. The rates under this assumption provide a lower bound to the labor force that can be expected given the size of the study area's population. The second assumption, LFPR2, is that the participation rates will converge to projected U.S. rates by the year 1990. LFPR2 represents an upper limit to the level of participation in the study area. The convergence assumption has the desirable property that, by 1990, the bulk of the adjustment will come from increased participation of young people facing the labor force entry decision for the first time. It seems highly likely that these young people, if opportunities exist, will participate in a way increasingly similar to their age-sex counterparts elsewhere in the United States.

III. IMPORTANT ECONOMIC ASSUMPTIONS

A critical question in the analysis of future developments in the study area concerns the racial distribution of the jobs that are created. Clearly, it is not sufficient to simply talk about the total number of jobs to be created; the distribution of the jobs between Northern Cheyenne and Anglo workers must also be addressed. The employment of Northern Cheyennes by industry was approached in the following manner:

--The available Northern Cheyenne labor force was calculated. This was assumed to be .95 of the total labor force, i.e., "normal" unemployment was assumed to prevent the unemployment rate from falling below five percent.

--An assumption was made about the proportion of new jobs in any given industry that would be available to the Northern Cheyennes. These assumed "entry factors" reflect both the

> historical level of participation of the Cheyennes in a given industry plus an estimate of the way in which conditions might change in the future. For example, even though there were no Cheyennes working in the mining sector in 1970, it was assumed that they would have access to ten percent of the new mining jobs that become available. This does not mean that they will get ten percent of the new jobs; but, if enough Northern Cheyenne workers are available, they will get ten percent of the jobs.

Although the ten percent entry factor seems low for the mining sector, as well as for the construction sector, the attitude of some people on the reservation is that the energy companies have not and will not employ a substantial number of Northern Cheyennes because of problems associated with lack of skill, absenteeism, and discrimination. On the other hand, if the Northern Cheyenne develop their own coal reserves, they could stipulate that Northern Cheyennes be employed. Therefore, two sets of entry factors for mining have been used in the analysis. The first reflects the ten percent entry factor associated with non-Indian coal development. The second assumes that the Northern Cheyenne will obtain 80 percent of the jobs associated with development of the reservation's coal resources. This results in an average entry factor of .4 for mining and construction. (The .10 factor for non-Indian developments and .80 for the Northern Cheyenne developments gives an overall factor of .40). The entry factors along with the 1970 distribution are shown in Table III-1.

Application of the entry factors to the number of new jobs in an industry then generates an estimate of the number of jobs available to Northern Cheyenne workers. If the available Northern Cheyenne labor force exceeds the available jobs, then actual Northern Cheyenne employment is assumed equal to available employment by industry, and the difference between the Northern Cheyenne labor force and employment is the number of unemployed.

If the number of available jobs exceeds the available Northern Cheyenne labor force, Northern Cheyenne employment is limited to the available labor force, the unemployment rate is five percent, and the available Northern Cheyennes are allocated by industry proportionally. In either case, Anglo employment by industry is calculated as the difference between total employment and Northern Cheyenne employment.

The other set of assumptions for the economic model concerned the responsiveness of the service and trade sectors (induced activity) to new income in the area. This new income will be generated by changes in agriculture, mining, or manufacturing activity.

TABLE III-1

ENTRY FACTORS

Sector	Entry Factor	Percentage of jobs held by Northern Cheyenne (1970 Census)
Agriculture	.18	18.0
Mining	.10	--
Construction	.10	.1
Manufacturing	.70	73.6
Transportation, Communication, Public Utilities	.15	11.4
Trade	.15	7.7
Finance, Insurance, Real Estate	.11	11.0
Services	.25	19.2
Government	.50	41.3
Other	.05	--

Source: Derived.

The short time series of employment and income data (five years) makes it questionable whether analytic estimation of this relationship can be done. Furthermore, it is not clear that such sophisticated analysis would be more reliable than a simpler method.

With this in mind, the following method was used. It is quite reasonable to assume that induced activity is directly related to the level of income in the study area. Thus, the level of induced employment can be expressed in terms of personal income. In other words, induced employment is some fraction of personal income. This fraction or coefficient was the ratio of a particular sector's employment to personal income. For example, if trade employment was 100 and total personal income was 10.0 million dollars,

the ratio would be .00001, or, for every dollar of personal income, there are .00001 employees in the trade sector. Thus, one additional person will be employed in the trade sector for every $100,000 of additional income.

Induced employment is assumed to occur in the following seven sectors:

(1) construction

(2) transportation, communication, and public utilities

(3) trade

(4) finance, insurance, and real estate

(5) services

(6) government

(7) other (self-employed)

Clearly, not all of the employment in each of these sectors can be attributed to residential activity within the county. One of the more obvious sectors for which this is the case is the transportation sector. Employment in the railroad industry is not related to the level of income in the study area, and if this "basic" activity is not removed from the employment total before the ratio is calculated, the ratio will be too high which will cause the industry to grow too fast. Therefore, the following adjustments were made before the ratios were calculated:

--Railway employment was removed from the transportation sector.

--Non-profit and welfare organizations were removed from the government total.

--State and federal employment was removed from the government total.

--The ratio for the "other" sector was calculated as a weighted average of the ratios for the trade, finance, and service sectors.

The ratios, both before and after the adjustments, are given in Table III-2. As indicated, the adjustments had a substantial effect on the size of the ratios.

TABLE III-2

RATIOS OF INDUCED EMPLOYMENT
TO PERSONAL INCOME
(EMPLOYEES PER $1,000 PERSONAL INCOME)

Sector	Unadjusted	Adjusted
Construction	.0014	.0014
Transportation, Communication, Public Utilities	.0088	.0035
Trade	.0104	.0104
Finance, Insurance, Real Estate	.0009	.0009
Services	.0189	.0109
Government	.0212	.0125
Other	.0148	.0083

Source: Derived.

IV. DEVELOPMENT ALTERNATIVES

Since forecasting involves an inexhaustible list of possible events and of factors that may cause their occurrence, social scientists have increasingly resorted to models that assume that the quantities to be predicted are functions of a relatively small number of variables. The models, including the one just described, do not pretend to be able to forecast variables such as population and employment with complete accuracy. However, if the model and development alternatives are carefully constructed, the results will be useful. The more certain the development alternatives, the more accurate the results will be. Since the immediate future is clearer than ten or fifteen years from now, the results predicted for the next five years will be more defensible than those for farther in the future.

In the following discussion, a set of basic employment forecasts is constructed for the impact area. Basic employment is the activity which generates new income in the area and is composed primarily of the agriculture, mining, and manufacturing industries.

A. AGRICULTURE

Agriculture has historically been the most important industry in the study area. However, as indicated in Chapter II, agricultural employment has been declining steadily as farming and ranching operations have become more capital-intensive. Nevertheless, land use is still predominantly agricultural; over 90 percent of the acreage is committed to agricultural uses. The 1975 Situation Statement for Rosebud County reports that the livestock industry dominates the industry with cattle and calves in the lead. The major crop is wheat followed by barley and corn.

With approximately 75,000 feeder cattle available in Rosebud County each fall, there is a natural opportunity for employment growth in the development of feedlots and packing plants. However, the present slump in the industry because of low cattle prices makes the possibility of development in this area highly unlikely in the near future.

In summary, it is doubtful that there will be sufficient increased activity in the study area to expect an increase in agricultural employment. Increased capital usage, although not as large a change as occurred during the past 25 years, will probably cause agricultural employment to continue to decline. Of course, this increased capital may cause agricultural incomes to increase but not dramatically. Also, with increased non-agricultural job opportunities, the number of available farm workers will be smaller, and there will probably be a demand for higher wages. This may cause decreased production and decreased income for the farm owner.

Based upon this information, it was decided to construct a single forecast of agricultural employment for the study area. Beginning with the agricultural employment detailed in the previous chapter--855 in 1973--this was reduced by one percent per year, which results in the agricultural employment forecasts in Table III-3. In order to account for increases in capital usage and productivity, agricultural income is assumed to grow at an annual rate of three percent.

B. MANUFACTURING

Traditionally, manufacturing has not been a major employer in the study area, with most of the activity concentrated in the wood products industry, which includes timber harvesting, timber thinning, and sawmills. This industry is generally confined to the southern part of the study area with the Eastmont Lumber Company in Ashland and the Black Sawmill in Lame Deer; however, the Eastmont Lumber Company burned in 1972 and caused a loss of about

TABLE III-3

STUDY AREA FORECASTED AGRICULTURAL EMPLOYMENT, 1973-2000

Year	Number
1973	855
1974	847
1975	839
1976	831
1977	824
1978	816
1979	808
1980	801
1981	794
1982	786
1983	779
1984	772
1985	764
1986	757
1987	750
1988	743
1989	737
1990	730
1991	723
1992	716
1993	710
1994	703
1995	696
1996	690
1997	684
1998	677
1999	671
2000	665

Source: Derived.

20 jobs. There is some interest in harvesting cottonwood along the Yellowstone River by a firm in Miles City. Interest has also been shown in the pine on the Northern Cheyenne Reservation by a firm in Sheridan, Wyoming; and, recently, there has been increased activity in thinning operations on the reservation. Even if the two new developments occur, neither should have a substantial

impact on employment. The only other large employer in the manufacturing sector is Guild Arts and Crafts in Ashland. Although over 100 persons have been employed there since 1970, they have recently reduced their work force, and it is not known whether the company will be able to sustain its present level of employment.

From this information, the alternative future outlined in Table III-4 has been developed. The increase in 1976 of 20 persons reflects the reopening of the Eastmont Lumber Company. Since no large, identifiable increases are expected, manufacturing employment is assumed to grow one percent per year after 1976. This assumes that Guild Arts and Crafts will continue to operate and employment in the timber industry will gradually increase.

C. MINING AND RELATED ACTIVITIES

The conceivable range of coal mining activities in the study area is extremely broad. Presently three mines are in operation--Western Energy, Peabody Coal, and Decker Coal. The 1973 figure of 9.6 million tons is only a small fraction of the possible production figure that would result if the coal reserves in the area were fully developed. Therefore, direct employment consequences of various levels of development will be provided. These will not only include estimates of mining employment but also of power plant employees, railroad employees necessary to haul the coal, and the number of construction workers needed to build the necessary energy facilities and equipment. It should be emphasized that these are only employment estimates. Actual future employment levels may differ if production technology, coal prices, and/or federal-state policy were to undergo substantial alteration.

The alternative levels of energy development can be classified into six categories.

Baseline: Includes only those facilities currently operating.

A. Western Energy Mine
B. Colstrip units 1 and 2
C. Peabody Big Sky Mine
D. West Decker Mine

TABLE III-4

STUDY AREA FORECAST OF MANUFACTURING EMPLOYMENT, 1973-2000

Year	Number
1973	236
1974	236
1975	236
1976	256
1977	258
1978	261
1979	264
1980	266
1981	269
1982	272
1983	274
1984	277
1985	280
1986	283
1987	286
1988	288
1989	291
1990	294
1991	297
1992	300
1993	303
1994	306
1995	309
1996	312
1997	315
1998	319
1999	322
2000	325

Source: Derived.

AF1: Includes all activities of the baseline plus Colstrip units 3 and 4.

A. Baseline
B. Western Energy Mine expansion
C. Colstrip units 3 and 4

AF2: Includes all activities in AF1 plus mining in the southern part of the study area and two new power plants. This assumes that only five percent of those workers employed in the south will live in Montana.

A. AF1
B. Power plant in the central area of the county
C. Additional mine in the central area
D. Power plant in the south
E. Two new coal mines in the south
F. Expansion of the Decker Mine
G. Expansion of the Peabody Big Sky Mine

AF3: Same developments as in AF2--however, 50 percent of workers are assumed to live in Montana.

AF4: Same as AF2--however, the future assumes that two coal mines will be developed on the Northern Cheyenne Reservation.

AF5: Same as AF4--however, one gasification plant is included.

Clearly, these six alternatives do not encompass all feasible future possibilities. They were constructed to reflect "average" activity given various assumptions about the level of energy development in the study area.

The simplest alternative, the Baseline, assumes that no additional coal development will occur in the area. This will give a standard of measure by which the other alternatives can be compared. It also gives an indication of the consequences if no further development is allowed.

Alternative Future 1 (AF1) includes only one additional activity--Colstrip units 3 and 4. This future will give the implications for the area if this project is

approved. Upon approval, AF1 will also become the new baseline for the study area.

Alternative Future 2 (AF2) assumes that two new 1000-megawatt (MWe) power plants--one in the south and one in the central part--will be built in addition to Colstrip units 3 and 4. Each will have a 10-MTPY (million tons per year) coal mine associated with it. In addition, the Decker Mine is assumed to expand to 20 MTPY by 1979 and Peabody's Big Sky Mine to 6 MTPY. Furthermore, this future assumes another 10-MTPY mine in the south. Since there is some question about how many of the people working in the Birney-Decker area will actually live there, two assumptions were made. For AF2, five percent of these persons are assumed to live in the study area, and Alternative Future 3 (AF3) assumes fifty percent will live there.

At this time, none of the alternatives has included development of the coal on the Northern Cheyenne Reservation. This is because the Northern Cheyenne have presently voided all the leases on the reservation and have not formulated a policy for development of the coal. Alternative Future 4 (AF4), however, includes two 10-MTPY mines on the reservation in addition to the developments in AF2. Since the Northern Cheyenne will probably keep this development tightly controlled and on their own terms, we have assumed that these two mines will have a work force composed of 80 percent Northern Cheyenne.

The last alternative future, AF5, includes all activities in AF4 plus one gasification plant in the study area. Given the high cost of constructing the facility and the high price of the gas produced, it is not clear that gasification will become a viable alternative in the future. However, since a plant of this type employs such a large number of persons, it has been included to show the consequences of such development.

The total number of energy-related workers for each alternative is presented in Table III-5. The project-by-project derivation of each is given in Tables A-1 through A-6 of the appendix.

V. SUMMARY OF FACTORS AFFECTING THE PROJECTION

Projecting the future necessitates making assumptions about economic behavior. This section will summarize those factors which could substantially affect the results and will give an idea of the direction of change if the factors are different. The importance of these assumptions should be kept in mind when analyzing the results.

TABLE III-5

ENERGY-RELATED EMPLOYMENT IN THE STUDY AREA, 1973-1990

Year	Baseline	AF1	AF2	AF3	AF4	AF5
1973	1066	1066	1066	1066	1066	1066
1974	1330	1330	1330	1330	1330	1330
1975	1118	1118	1118	1118	1118	1118
1976	913	913	924	924	924	924
1977	698	1433	1486	1675	1486	1486
1978	473	1783	1860	1995	1860	1860
1979	473	2213	2273	2390	2273	2273
1980	473	1576	1748	1928	1888	1888
1981	473	1051	1313	1588	1562	1562
1982	473	826	1189	1473	1564	1564
1983	473	826	1767	2064	2178	2178
1984	473	826	2022	2265	2313	2313
1985	473	826	2646	3277	3077	3077
1986	473	826	2702	3702	3238	3738
1987	473	826	2251	3539	2922	3947
1988	473	826	1373	2688	2075	4500
1989	473	826	1336	2318	1918	3568
1990	473	826	1277	1728	1854	2609

Source: Derived.

A. DEVELOPMENT ALTERNATIVES

There are literally thousands of possible combinations of agriculture, manufacturing, and mining activities, and no one pretends to be able to predict which one will occur. Therefore, if the actual events in the future represent a greater or lesser amount of employment and income than in the alternatives presented here, the future population will also be greater or lesser.

B. NORTHERN CHEYENNE ENTRY FACTORS

Less obvious is the influence of the entry factors on the projections. If employers outside the reservation increase their utilization of the available Northern Cheyenne labor force or if there is further development on the reservation, the entry factors will be higher, increasing the Indian employment, reducing the Northern Cheyenne unemployment rate, and in turn reducing the necessary amount of Anglo in-migration. Thus, the total population of the county will be lower.

C. CONSTRUCTION WORKERS

Three factors related to construction workers can affect their impact on the area. The Construction Worker Profile Survey[1] (CWP) found that the median annual income of new construction workers in Forsyth was $14,429 as compared to the long-time resident income of $11,059. This implies that the construction worker has more money to spend on goods and services; therefore, he will have a greater impact than a long-time resident if he spends the same proportion of his income locally as does the long-time resident. The CWP survey found that while the long-time resident bought 65 percent of his goods and services locally, the construction worker only purchased 59 percent locally. If the incomes were the same, the construction worker would have less influence on local activity than would a long-time resident.

When both of these factors--the amount of income and the percentage of local expenditures--are averaged, the CWP survey found that the average construction worker spends 32 percent more locally than the average local worker. Thus, one construction worker will contribute more to the local economy than the average long-time resident; this implies that the "multiplier" applicable to construction workers should be higher than that indicated for the local resident.

A third factor affecting the impact of construction workers is their residential settlement patterns. If more or fewer construction workers than the number assumed for this project actually locate in the study area, the resulting population will also be higher or lower. This factor

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[1] Construction Worker Profile, A Study for the Old West Regional Commission by Mountain West Research, Inc., December, 1975.

becomes important when there is a high level of construction activity in the area and physical constraints limit the number of construction workers who can live in the study area.

CHAPTER IV

POPULATION AND EMPLOYMENT PROJECTIONS

The reason for making different assumptions regarding alternative futures, residentiary patterns, and labor force participation behavior is that we cannot say with certainty which set of conditions will prevail or, for that matter, whether any of them will occur. The best approach is to settle on a combination of conditions that is most probable and then attempt to establish a confidence interval around the projections that are developed for that particular combination. Because the study area labor force participation rates for some of the population groups differ appreciably from their national counterparts, the most probable course is for these rates to rise toward the national averages. In fact, the two participation rate assumptions make little difference in the final population totals. For the baseline alternative, the difference was only 2.4 percent. Hence, all of the detailed analysis that follows is concentrated on the results using the converging rates. The results for the baseline and the five alternative futures for both the constant labor force participation rate assumption and the converging labor force rates are presented in Tables A-7 through A-18 in Appendix A.

Section I of this chapter presents the population and employment projection results for the study area as a whole. Section II details the implications for Rosebud County, and Section III presents the population alternatives for the major areas in the county.

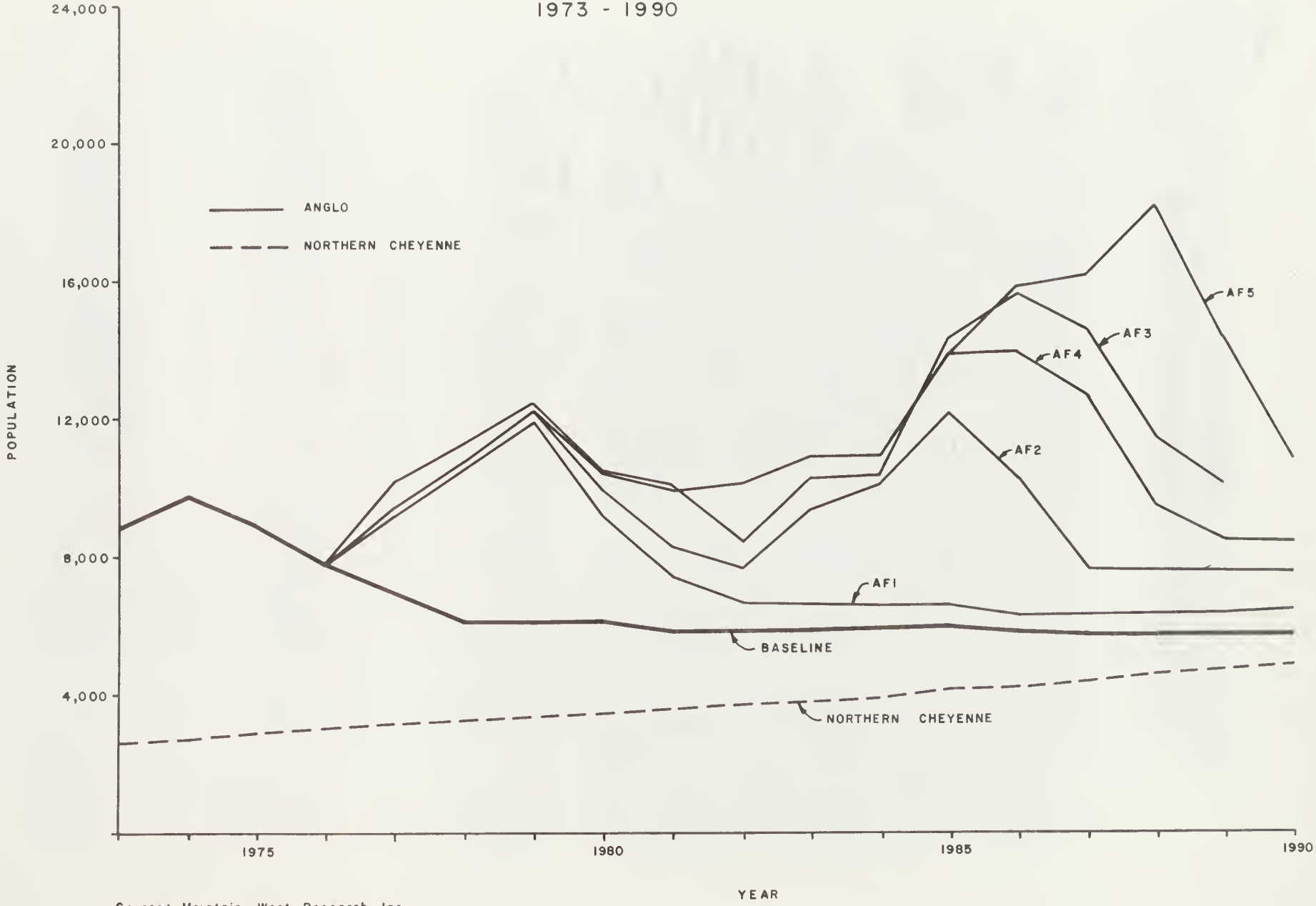
I. STUDY AREA PROJECTIONS

The projections for the study area include the population and employment levels in the Busby-Decker census division of Big Horn County. Figure IV-1 shows the population growth paths of the baseline and of the five alternatives.

A. NORTHERN CHEYENNE

The Northern Cheyenne population, indicated by the broken line in Figure IV-1, is the same for all of the alternatives since no in- or out-migration by Northern Cheyennes is allowed.

FIGURE IV - 1
ANGLO AND NORTHERN CHEYENNE
POPULATION GROWTH
STUDY AREA
1973 - 1990



Source: Mountain West Research, Inc.

As a result of the migration assumption and of the relatively high fertility rate, there is a steady increase in population. This large natural increase leads to a shifting age distribution of the Northern Cheyenne population as indicated by Figure IV-2. This chart shows that the large population of young people in 1970 has increased the proportion in the middle-age groups in 1990. The percentage of Northern Cheyennes under the age of 15 has also increased, indicating that the middle-age group may grow even faster after 1990.

In contrast to this steadily increasing population is the Northern Cheyenne employment trend for the baseline alternative which is indicated in Figure IV-3. Although a slight increase is apparent during the construction phase of Colstrip units 1 and 2, employment falls and then shows a small and gradual increase throughout the rest of the period.

A similar pattern is indicated for AF1 which shows continued employment increases throughout the construction of Colstrip units 3 and 4 and then drops to a level slightly above the baseline. The remaining alternatives indicate a continued increase in employment with AF4 and AF5 both having a high level of employment since both include development of Northern Cheyenne coal. Since ten percent of construction jobs are assumed to be available to Northern Cheyennes, all of the alternatives track closely with the amount of construction activity in the study area.

Related to these employment trends are the unemployment rates illustrated in Figure IV-4. However, these should be interpreted with caution. Due to the small size of the numbers, undercounting by the Bureau of the Census, and differences in definition, the projected Northern Cheyenne unemployment rate was only five percent in the early years compared to the various estimates of the rate that are over ten percent. Therefore, the unemployment rates should only be interpreted as order of magnitude trends. It makes little difference whether the rate increases from five percent to fifty percent as indicated by the baseline or whether the rate rises from fifteen percent to sixty percent. In either case, the point is that there is a large, young Northern Cheyenne population and a relatively small number of job opportunities, implying substantial unemployment in the future. The first three alternative futures, although each lowers the rate, do not represent sufficient job opportunities to reduce unemployment to an acceptable level. Only AF4 and AF5 force the rate down to five percent.

FIGURE IV-2
NORTHERN CHEYENNE
POPULATION DISTRIBUTION
1970 & 1990

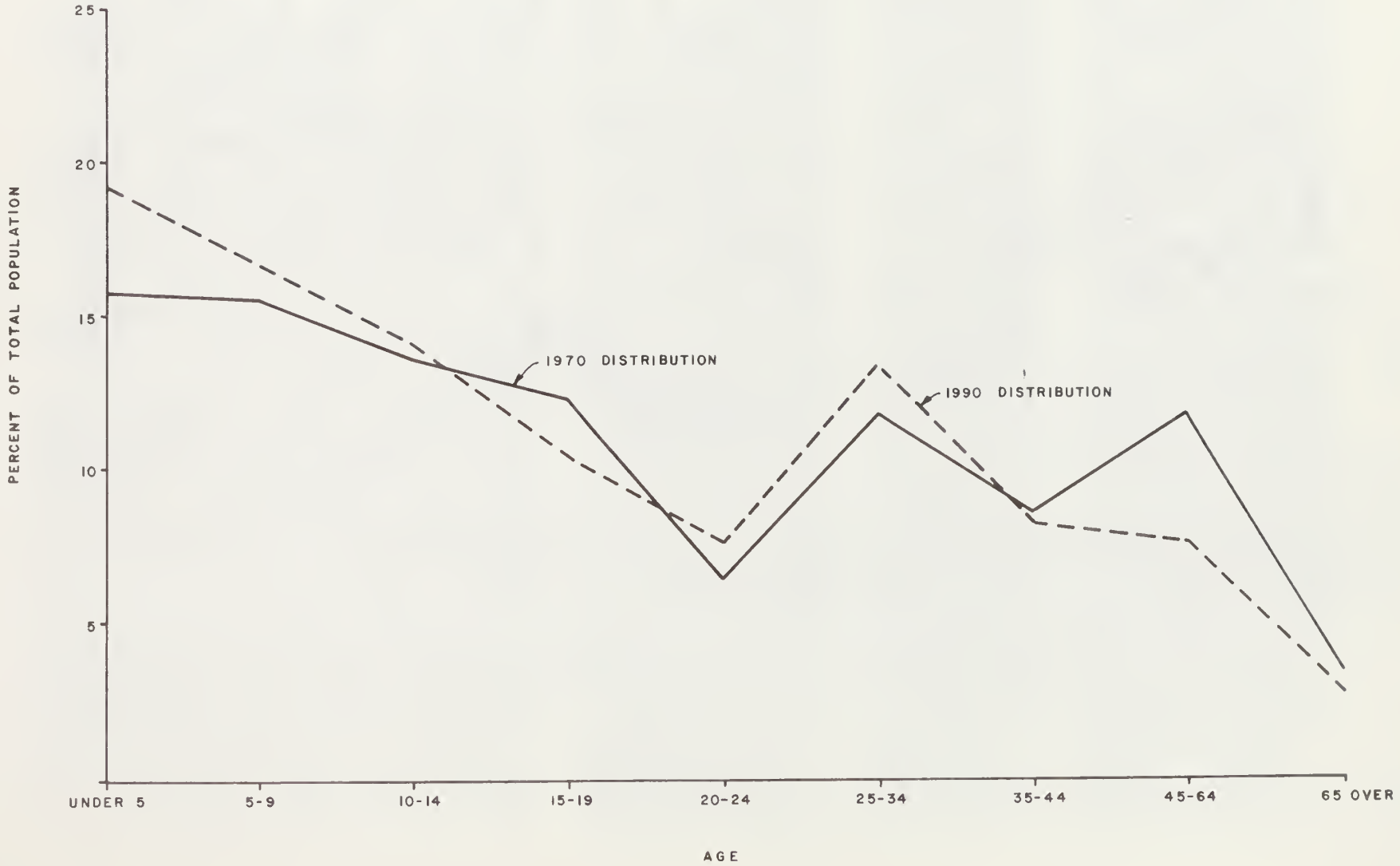
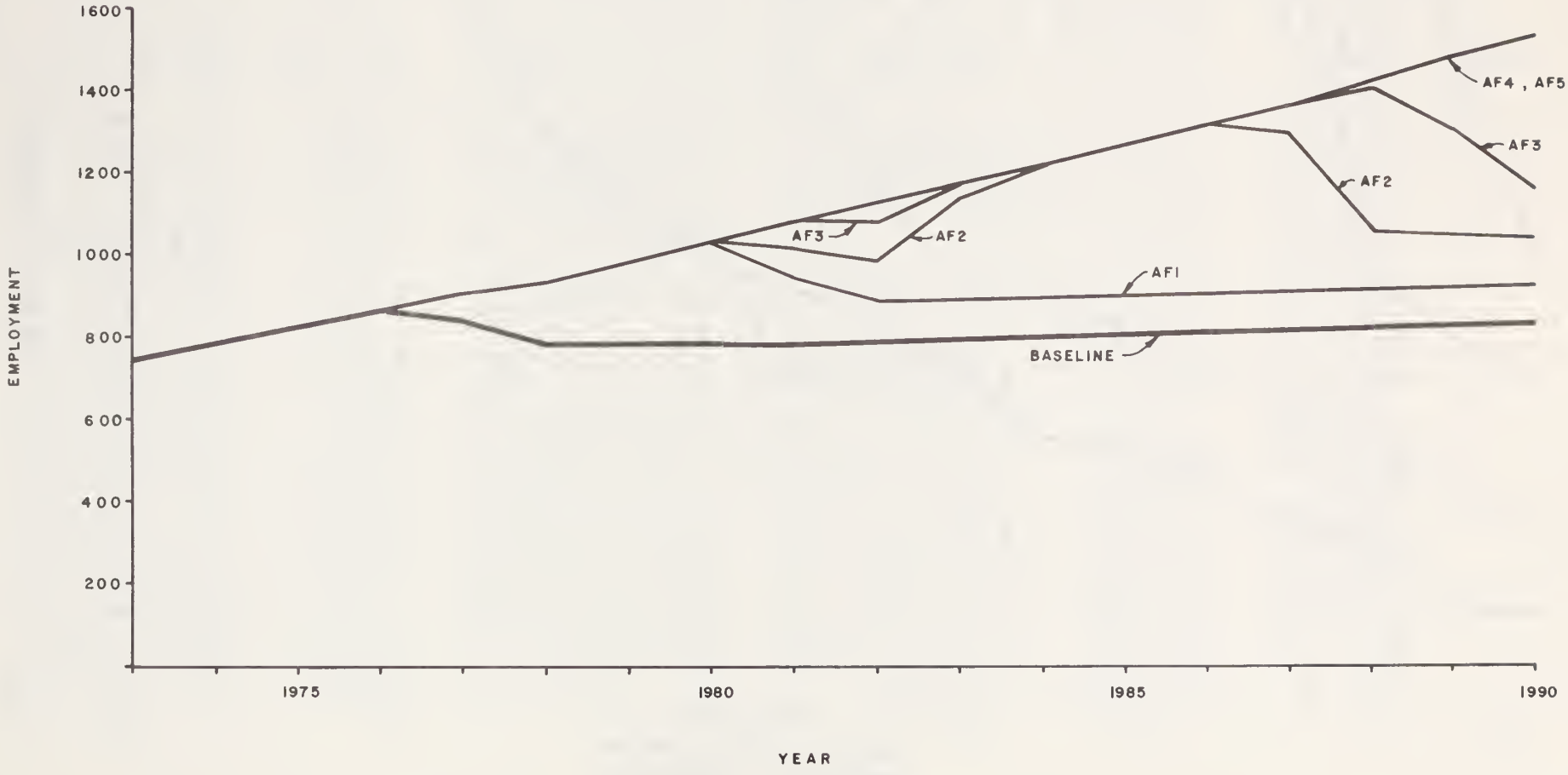
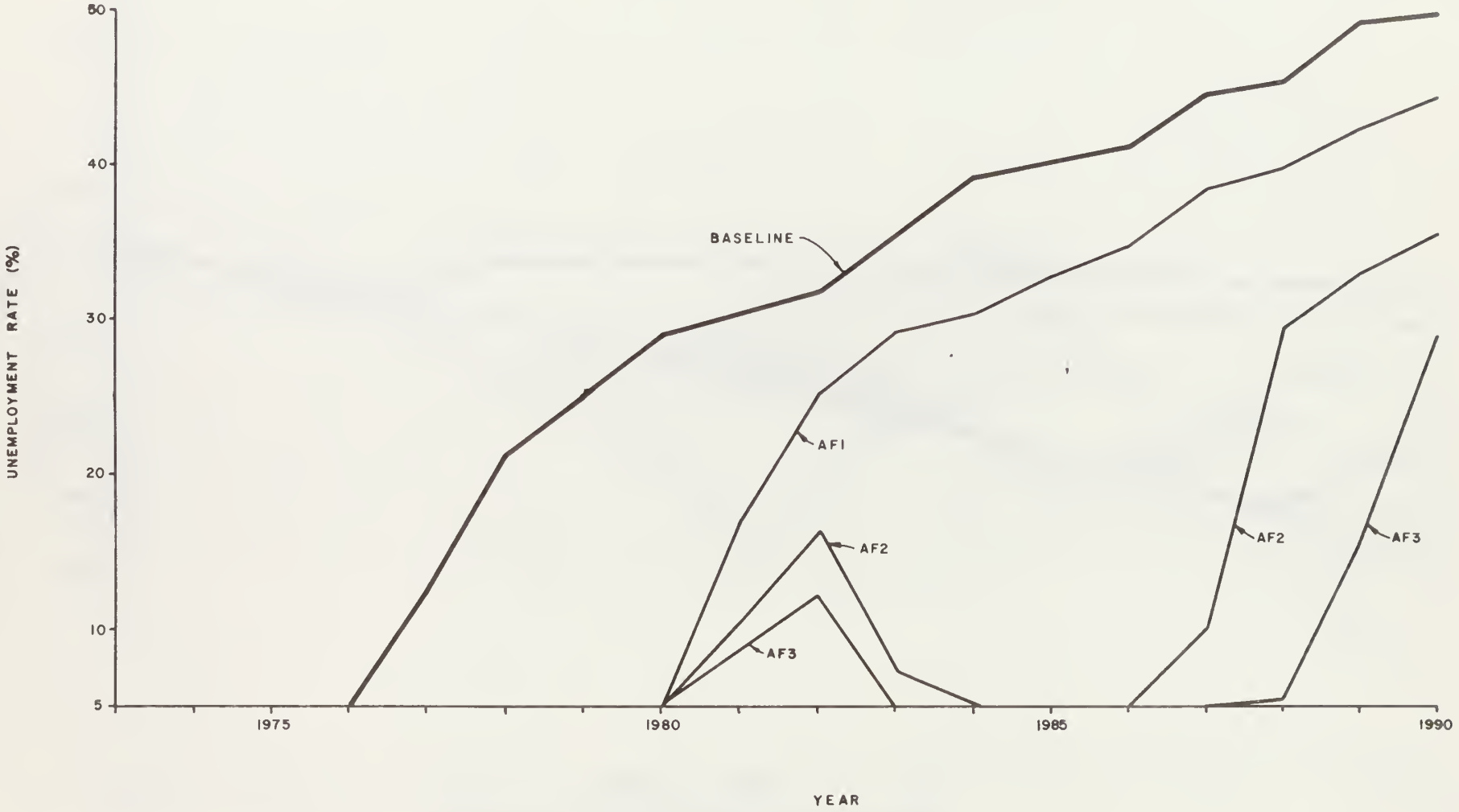


FIGURE IV - 3
NORTHERN CHEYENNE EMPLOYMENT
1973 - 1990



Source : Mountain West Research, Inc.

FIGURE IV - 4
NORTHERN CHEYENNE
UNEMPLOYMENT RATES
1973 - 1990



Source: Mountain West Research, Inc.

B. ANGLO POPULATION

The baseline path for the Anglo population shows a decline after 1974 when the construction of Colstrip units 1 and 2 slows down. After 1978, the Anglo population stabilizes between 5600 and 6000, a net gain of about 1000 since 1970. Most of this can be attributed to Colstrip 1 and 2.

AF1 departs the baseline in 1977 when construction begins on Colstrip 3 and 4. The peak of 11,800 occurs in 1979, after which the population steadily decreases to 6500 in 1982 and remains around this level. The 1990 population represents a gain of 549 over the baseline projection and can be attributed to Colstrip 3 and 4.

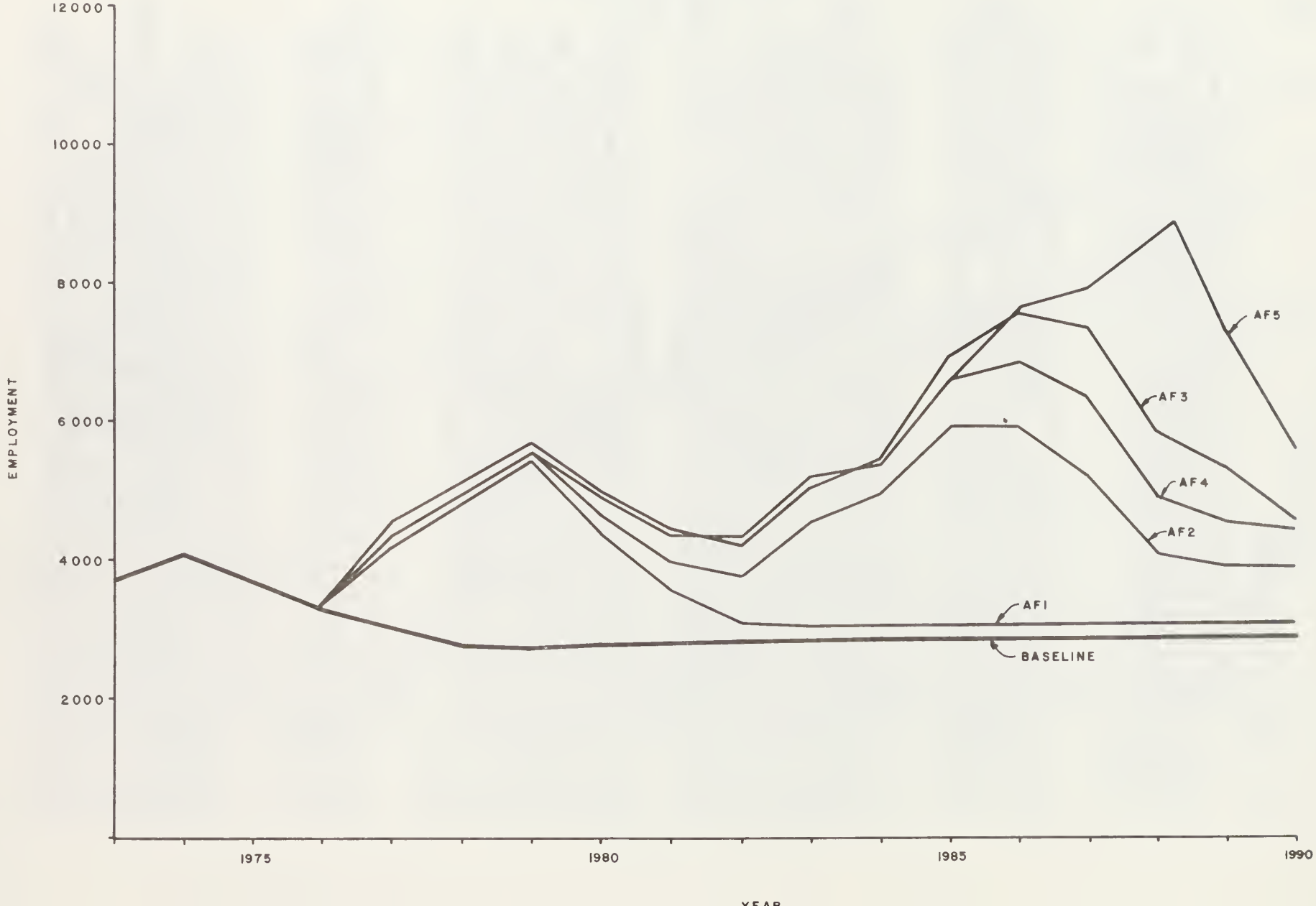
AF2 reflects the population impact of moderate development of energy resources in the Colstrip area and the southern part of the county. This future assumes that only five percent of the workers in the south will live within the study area. In contrast, AF3 assumes 50 percent of the workers will live in the study area. The implications of this change are illustrated by the difference in the population paths of AF2 and AF3. As expected, both are above the baseline population in 1990, with AF2 showing an increase of 1800 and AF3 an increase of 2600.

The fourth alternative assumes all of the developments and assumptions included in AF2 and adds two coal mines on Northern Cheyenne lands. It is interesting to note that even though the Northern Cheyenne are allocated 80 percent of these additional mines, there is still an increase of over 800 in the number of Anglos in the study area for 1990. This can be attributed to the fact that there are not enough Northern Cheyennes to fill all of the jobs allocated to them and that the deficit is filled by Anglos.

AF5, the last alternative, assumes one gasification plant is built in the study area. The large influx of construction workers is evidenced by the large increase from 1985-1988 with a decline after 1988 to a level 5000 above the baseline in 1990.

The employment trends for the Anglos are shown in Figure IV-5. As would be expected, these closely follow the population paths. The baseline indicates a decline in employment after the construction of Colstrip 1 and 2, reaching a low in 1979 and then gradually increasing through 1990. Employment for AF1 peaks in 1979 and declines to a level above and parallel to that for the baseline. The four remaining alternatives all show fluctuations related to construction activity and a final employment level above the baseline and AF1.

FIGURE IV - 5
ANGLO EMPLOYMENT GROWTH
STUDY AREA
1973 - 1990



II. ROSEBUD COUNTY PROJECTIONS

Two assumptions were necessary to convert the study area populations to include only Rosebud County. The first is that there will be no substantial movement of Northern Cheyennes from Rosebud County to Big Horn County and from Big Horn County to Rosebud County. The second assumes that there will be no out-migration of Anglos from the Busby-Decker census division.

The population projections associated with each set of alternative developments are given in Table IV-1 and depicted in Figure IV-6. The minimum level of development, the baseline alternative, indicates an increase of almost 50 percent in population during the period 1970-1990. Of the total change 56 percent, or 1701, is due to the natural increase in the Northern Cheyenne population, and 44 percent, or 1312, is a result of the natural increase in Anglo population and Anglo in-migration into the county. Since the Northern Cheyenne population increases faster than the Anglo population, the proportion of Northern Cheyenne in the county rises from 30 percent in 1970 to 39 percent in 1990.

The construction of Colstrip 3 and 4 causes the projected 1990 population of the county to increase 549 more than the baseline to a level of 9594. The additional in-migrants cause the proportion of Northern Cheyennes to fall from the 39 percent baseline figure to 36.8 percent. The population of the county peaks in 1979 at 13,904 persons.

AF2 causes the population to increase to 10,849 by 1990, which is 20 percent more people than for the baseline. Whereas both the baseline and AF1 have two periods for which the population increases and decreases rapidly, AF2 has one additional period. This occurs between 1982 and 1988 when the population increases from 10,025 to 14,944 and then declines to 10,619. Once again the percentage of Northern Cheyennes falls from the baseline to 32.5 percent.

The only difference between AF2 and AF3 is the assumption that 50 percent rather than five percent of the workers in the Birney-Decker area will live in the study area. This does not mean that the additional workers will live in Rosebud County as was assumed here, but it does give an indication of the impact if they do. Furthermore, the bulk of the increase between AF2 and AF3 will locate in the part of the county that is south of the reservation. Thus, for this alternative, at the peak of construction activity in 1987 over 4300 might live in this area. After all of the construction is completed, over 800 people would still be in the area.

TABLE IV-1

ROSEBUD COUNTY TOTAL POPULATION, 1970-1990

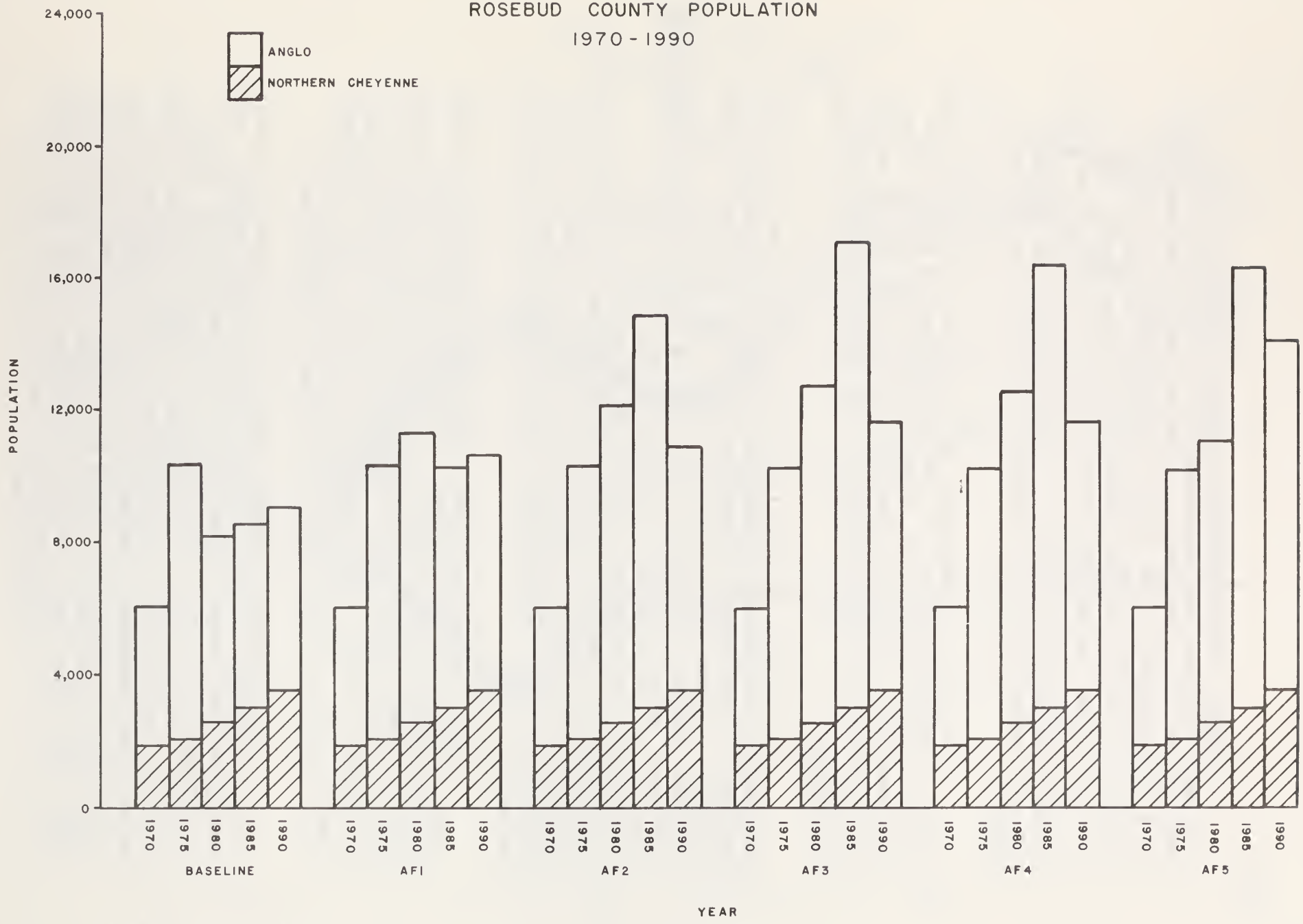
Year	Baseline	AF1	AF2	AF3	AF4	AF5	Northern Cheyenne
1970	6032	6032	6032	6032	6032	6032	1829
1971	6824	6824	6824	6824	6824	6824	1902
1972	7146	7146	7146	7146	7146	7146	1930
1973	10291	10291	10291	10291	10291	10291	1989
1974	11351	11351	11351	11351	11351	11351	2057
1975	10408	10408	10408	10408	10408	10408	2128
1976	9515	9515	9515	9515	9553	9553	2198
1977	8747	11287	11480	12149	11480	11480	2271
1978	8003	12505	12786	13287	12786	12786	2349
1979	8102	13904	14125	14538	14125	14125	2437
1980	8207	11436	12058	12682	12547	11157	2527
1981	8009	9681	10467	11296	11244	11244	2614
1982	8127	8937	10025	10867	11387	11387	2709
1983	8255	9038	11935	12813	13310	13310	2809
1984	8391	9147	12620	12984	13493	13493	2908
1985	8533	9262	14742	17026	16393	16393	3008
1986	8439	9038	14944	18420	16623	18652	3105
1987	8480	9059	13079	17416	15303	18819	3205
1988	8731	9295	10619	14437	12343	21089	3312
1989	8885	9439	10729	13249	11548	17457	3419
1990	9045	9594	10849	11666	11676	14080	3530
% change	49.9	59.0	79.8	93.4	93.6	133.4	93.0
% Northern Cheyenne	39.0	36.8	32.5	30.2	30.2	25.1	

Source: Mountain West Research, Inc.

FIGURE IV-6

ROSEBUD COUNTY POPULATION

1970 - 1990



Source: Mountain West Research, Inc.

Since the construction workers involved in the Northern Cheyenne coal development tend to fill the gaps left by the other projects, AF4 shows much less year-to-year fluctuation in the county's population. In fact, the 1990 population is only 10 above AF3, although AF4 assumes the five percent residential factor rather than the 50 percent assumed for AF3. The population consequences of the development of Indian coal can be seen by the difference between AF4 and AF2. The difference in 1990 of 827 will most likely be concentrated around the Ashland area.

The final alternative, AF5, includes one gasification plant in addition to all of the activities of AF4. This future causes an increase in population of over 5000 from the baseline. The peak population of 21,089 is 250 percent more than the 1970 population of the county. Almost half of this increase can be directly attributed to the gasification plant.

Per capita, non-agricultural labor income for the Anglos and the Northern Cheyenne is shown in Figures IV-7 and IV-8. The actual values are given in Table A-19 of the appendix. These are in terms of real 1970 dollars. The baseline shows a leveling of per capita income around $2600 after a peak of $3014 in 1974. In contrast, the Northern Cheyenne per capita income shows a steady decline after 1975, reaching a low of $836 in 1990. This decline can be attributed to the lack of job opportunities for the Northern Cheyenne combined with the steady natural increase in the population. Northern Cheyenne per capita income as a percentage of Anglo income falls from 48 percent in 1973 to 32 percent in 1990.

All five alternatives indicate a higher level of per capita income for both groups. AF1 increases the per capita income of the Anglos by 22 percent over the baseline with the peak income occurring during the construction phase of Colstrip 3 and 4. AF2 and AF4 have similar levels of income in 1990, both considerably higher than the baseline and AF1. AF3 and AF5 also end with incomes nearly equal and higher than all of the other alternatives.

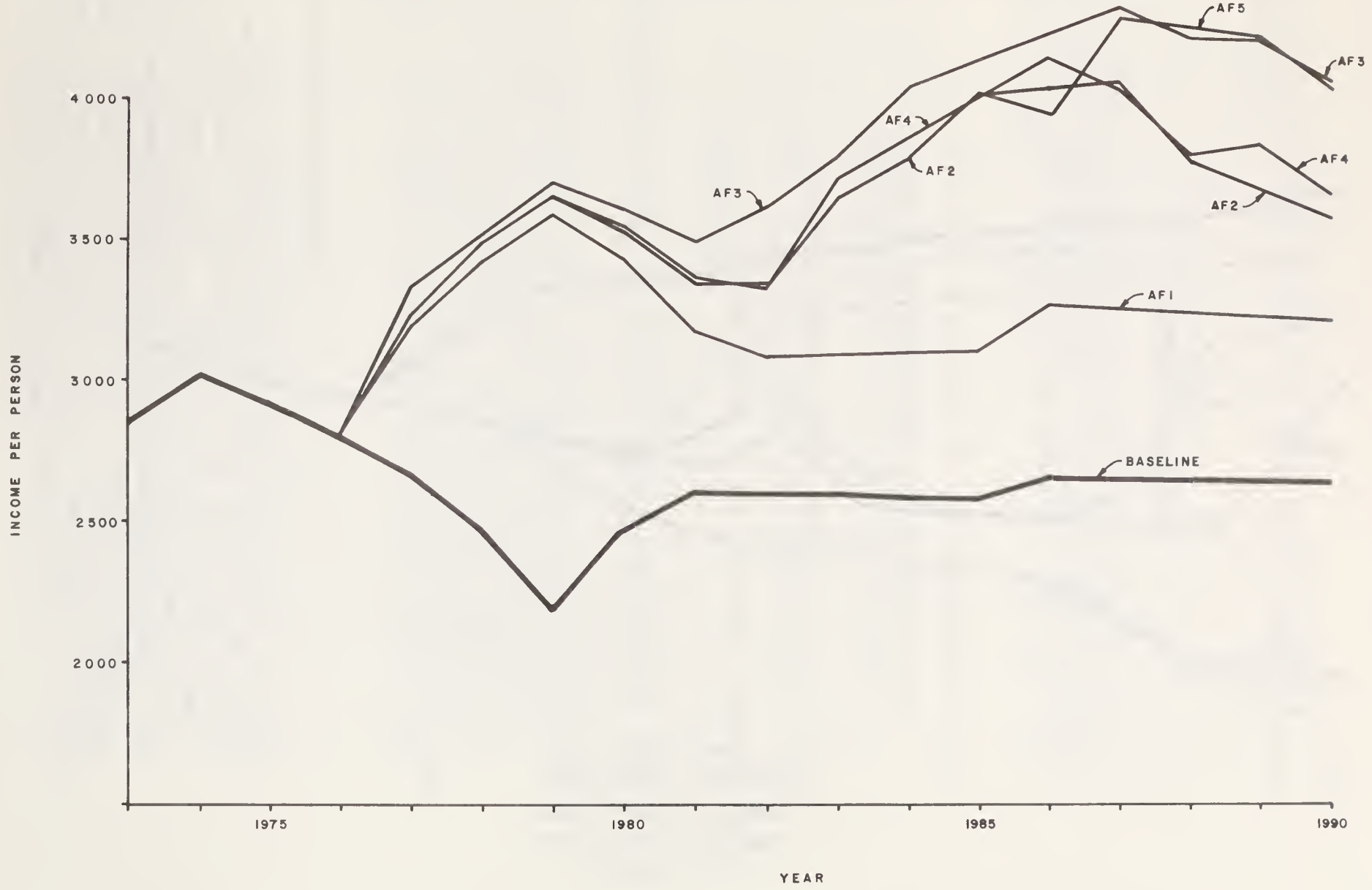
The Northern Cheyenne trends for the baseline and AF1 are somewhat different from those for the Anglos. Once energy-related construction activity is completed, both show steady declines. The natural increase of the population and the fact that new employment opportunities for the Northern Cheyenne are not expanding as fast combine to cause this phenomenon. A similar trend is evident for AF2 and AF3, which show increasing per capita incomes provided there is a high level of construction activity. Once this ends, the income level begins to decline. Only AF4 and AF5 have sufficient job opportunities to keep pace with the

FIGURE IV-7

ANGLO PER CAPITA INCOME

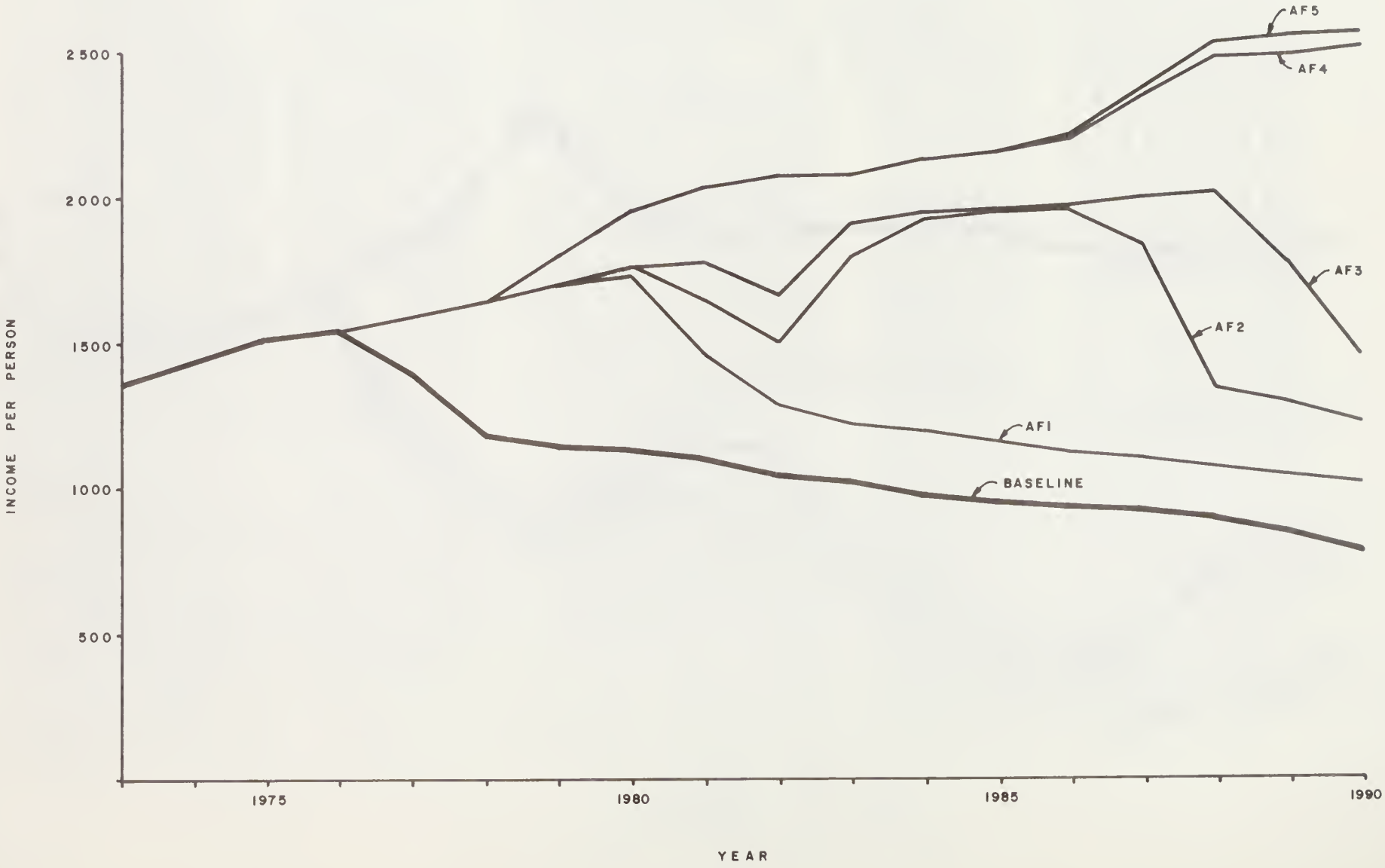
(CONSTANT DOLLARS)

1973 - 1990



Source: Mountain West Research, Inc.

FIGURE IV-8
NORTHERN CHEYENNE
PER CAPITA INCOME
(CONSTANT DOLLARS)
1973 - 1990



Source: Mountain West Research Inc.

expanding Northern Cheyenne population and to keep per capita income high.

III. COMMUNITY ANALYSIS

The county's population for each of the six alternatives has been allocated to the five major towns and to four general geographical areas. The towns include Forsyth, Colstrip, Rosebud, Lame Deer, and Ashland. The four areas are as follows:

(1) North--the area north of the Yellowstone River;

(2) Central--the area south of the Yellowstone River and north of the Northern Cheyenne Reservation;

(3) Reservation--the Northern Cheyenne Reservation; and

(4) South--the area south of the Northern Cheyenne Reservation.

The populations given for the four rural areas exclude the populations of the five towns which are given separately.

The determination of the population of a given place is complicated by the lack of annual employment or population estimates for areas smaller than the county level. Even the 1970 Census does not have population numbers for any towns other than Forsyth. The only other population numbers from the Census are for the ten enumeration districts in the county. A detailed analysis of the 1970 Census and the 1976 Special Census population counts is given in Appendix B.

A. ALLOCATION PROCEDURE

The allocation procedure used information from two basic sources. The 1976 Special Census was used to estimate the distribution of population for 1976 among each of the nine units listed above. The annual change for the years between 1970 and 1976 was allocated to each area in relation to its change during the entire six-year period. For example, if Forsyth accounted for 17 percent of the total increase between 1970 and 1976 and if the predicted change between 1971 and 1972 was 100, then 17 was added to Forsyth's 1971 population to determine its 1972 population.

After 1976, the population change was distributed on the basis of two criteria. First, the proportion of the county's population within the town or region was used to determine the area's normal share of the population. The second concerns the location of the specific project. For example, the population impact of the construction of Colstrip 3 and 4 was allocated to Forsyth, Colstrip, Rosebud, and the central region according to the distribution of the impact that occurred as units 1 and 2 were being built. If there was no change in the level of energy-related activity, the population was allocated according to the first premise.

B. POPULATION RESULTS

The population projection results for the baseline for the five towns and the four regions are given in Table IV-2. The baseline indicates a steady population for most areas of the county after the construction of Colstrip 1 and 2 is completed in 1978. Specifically, Forsyth's population will stabilize around 1900 persons after reaching a peak of 2734 in 1974. The 1990 population represents a gain of only 3.1 percent over Forsyth's 1970 population. Although this seems small, remember that Forsyth's population declined almost eight percent from 1960 to 1970, and the increase represents a turnabout from this trend. By far the largest increase occurred in Colstrip where the population increased from around 200 in 1970 to 1352 in 1990.[1] The town of Lame Deer and the remainder of the reservation are expected to increase over 50 percent in population during the period. As mentioned in the county analysis section, this can be attributed to the natural increase in the Northern Cheyenne population. The decline between 1970 and 1976 for the Northern Cheyenne Reservation (excluding Lame Deer) is a reflection of the Special Census data and is probably due to movement from the rural areas of the reservation to Lame Deer or Ashland. Since it does not seem probable that this trend would continue, the rural area of the reservation will be assumed to grow in proportion to the Northern Cheyenne population after 1976. The central area of the county grows as the construction activity at Colstrip increases, then declines afterwards. The constant population in the south reflects the fact that no new activity is assumed for this region under the baseline alternative.

Table IV-3 gives the distribution of the population for AF1 and indicates that much of the population increase over the baseline will be centerd in Colstrip. Colstrip grows to 1901 persons in 1990; Forsyth and Rosebud increase

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[1] The 1973-1975 estimates differ from Western Energy's due to differences between the actual and assumed phasing of construction.

TABLE IV-2

REGIONAL DISTRIBUTION OF THE POPULATION, 1970-1990
BASELINE

Year	Rosebud County	Forsyth	Colstrip	Rosebud	Lame Deer	Ashland	North	Central	Reservation	South
1970	6032	1873	200	100	1100	436	491	803	999	30
1971	6824	1982	643	119	1118	496	496	943	997	30
1972	7146	2031	737	122	1116	556	501	1083	970	30
1973	10291	2564	2834	163	1127	616	506	1490	961	30
1974	11351	2734	3503	176	1142	676	511	1622	957	30
1975	10408	2558	2808	163	1160	736	516	1484	953	30
1976	9515	2412	2159	150	1176	797	521	1321	949	30
1977	8747	2266	1586	139	1208	824	526	1188	980	30
1978	8003	1978	1385	121	1242	851	531	851	1014	30
1979	8102	1982	1388	121	1280	864	532	853	1052	30
1980	8207	1987	1391	121	1319	877	533	858	1091	30
1981	8009	1887	1321	115	1357	862	507	802	1128	30
1982	8127	1895	1327	115	1398	877	509	806	1170	30
1983	8255	1905	1334	116	1441	893	511	812	1213	30
1984	8391	1918	1343	117	1484	910	515	818	1256	30
1985	8533	1933	1354	118	1527	927	519	826	1299	30
1986	8439	1866	1307	114	1570	923	501	788	1340	30
1987	8580	1880	1317	115	1613	939	505	119	1384	30
1988	8731	1896	1327	116	1660	958	509	805	1430	30
1989	8885	1912	1339	117	1706	977	513	815	1476	30
1990	9045	1931	1352	118	1754	997	518	822	1524	30
Δ1970-1990	3013	58	1152	18	654	561	27	21	525	0
% change	49.9	3.1	576.0	18.0	59.4	128.7	5.5	2.4	52.5	0

Δ = change.

Source: Mountain West Research, Inc.

TABLE IV-3

REGIONAL DISTRIBUTION OF POPULATION, 1970-1990
ALTERNATIVE FUTURE 1

Year	Rosebud County	Forsyth	Colstrip	Rosebud	Lame Deer	Ashland	North	Central	Reservation	South
1970	6032	1873	200	100	1100	436	491	803	999	30
1971	6824	1982	643	119	1118	496	496	943	997	30
1972	7146	2031	737	122	1116	556	501	1083	970	30
1973	10291	2564	2834	163	1127	616	506	1490	961	30
1974	11351	2734	3503	176	1142	676	511	1622	957	30
1975	10408	2558	2808	163	1160	736	516	1484	953	30
1976	9515	2412	2159	150	1176	797	521	1321	949	30
1977	11287	2764	3549	183	1208	824	526	1223	980	30
1978	12505	2860	4865	201	1242	851	531	911	1014	30
1979	13904	3119	5873	224	1280	864	532	930	1052	30
1980	11436	2620	3887	178	1319	877	533	901	1091	30
1981	9681	2215	2613	145	1357	862	507	824	1128	30
1982	8937	2025	1953	130	1398	877	509	845	1170	30
1983	9038	2025	1953	130	1441	893	511	842	1213	30
1984	9147	2028	1956	130	1484	910	515	838	1256	30
1985	9262	2034	1961	131	1527	927	519	834	1299	30
1986	9038	1929	1860	124	1570	923	501	761	1340	30
1987	9059	1936	1867	124	1613	939	505	761	1384	30
1988	9295	1945	1876	125	1660	958	509	762	1430	30
1989	9439	1957	1888	126	1706	977	513	766	1476	30
1990	9594	1972	1901	127	1754	997	518	771	1524	30
Δ1970-1990	3563	99	1701	27	654	561	27	-32	525	0
% change	59.1	5.3	850.5	27.0	59.4	128.7	5.5	-4.0	52.5	0

Δ = change

Source: Mountain West Research, Inc.

by 41 and 18, respectively, over the baseline projection. There is no change for the Northern Cheyenne areas or for the north and south regions.

The results for AF2 are given in Table IV-4 and indicate the consequences of a moderate level of coal mining and conversion activity. It is not surprising that Colstrip will receive much of the impact from this development since much of it will occur in the central part of the county. AF2 shows that the southern part of the county could expect a population of 111 in 1990 if five percent of the workers involved in the Birney-Decker developments choose to live in Montana. In contrast, AF3, as shown in Table IV-5, indicates a population of 958 in 1990 if 50 percent of these workers live in Montana.

The projections for AF4 are presented in Table IV-6, which shows that most of the additional population resulting from this alternative is expected to locate near Ashland with some impact on Forsyth and Colstrip. Ashland has a 1990 population of 1353 which is 35 percent greater than the baseline alternative. The 1990 populations for Forsyth and Colstrip are 2320 and 3156, respectively.

The final alternative, AF5, given in Table IV-7, results in the greatest population for the county. Colstrip has a peak population of almost 8000 and a 1990 population of 4045. Forsyth's population peaks at 4197 and ends in 1990 at 3470. The city of Ashland experiences a peak population of 5459 at the height of construction activity, and its 1990 population level is 3870.

The analysis of the community populations under the six alternatives highlights the critical planning problem that will be associated with the large fluctuations in population due to the movement of construction workers into and out of the county. This is emphasized by the data in Table IV-8. The town of Colstrip could experience a temporary peak population of almost 8000 but a final population of only 4045 under AF5. Whether these people live within the town or in rural parts of the county makes little difference; the question is whether the town and the county can provide the necessary public services to these people on a temporary basis. The ratio of the peak population to the 1990 population gives some idea of the magnitude of this population influx. For the city of Forsyth the peak population could be more than 50 percent greater than its projected population in 1990. The same measure for Colstrip indicates that its peak is most likely to be at least twice its 1990 population.

TABLE IV-4

REGIONAL DISTRIBUTION OF POPULATION, 1970-1990
ALTERNATIVE FUTURE 2

Year	Rosebud County	Forsyth	Colstrip	Rosebud	Lame Deer	Ashland	North	Central	Reservation	South
1970	6032	1873	200	100	1100	436	491	803	999	30
1971	6824	1982	643	119	1118	496	496	943	997	30
1972	7146	2031	737	122	1116	556	501	1083	970	30
1973	10291	2564	2834	163	1127	616	506	1490	961	30
1974	11351	2734	3503	176	1142	676	511	1620	957	30
1975	10408	2558	2808	163	1160	736	516	1484	953	30
1976	9515	2412	2159	150	1176	797	521	1321	949	30
1977	11480	2787	3669	185	1208	824	526	1223	980	78
1978	12786	2899	5070	204	1242	851	531	911	1014	64
1979	14125	3150	6032	226	1280	864	532	930	1052	59
1980	12058	2712	4366	184	1319	877	533	901	1091	75
1981	10467	2252	2803	145	1357	862	507	824	1128	87
1982	10025	2184	2779	140	1398	877	509	845	1170	123
1983	11935	2476	4295	159	1441	893	511	842	1213	105
1984	12620	2574	4788	164	1484	910	515	838	1256	91
1985	14742	2886	6379	185	1527	927	519	834	1299	187
1986	14944	2834	6554	181	1570	923	501	761	1340	280
1987	13079	2528	4936	161	1613	939	505	761	1384	352
1988	10619	2104	2702	135	1660	959	509	762	1430	359
1989	10729	2124	2755	137	1706	977	513	766	1476	275
1990	10849	2155	2850	139	1754	997	518	771	1524	141
Δ1970-1990	4817	282	2650	39	654	561	27	-32	525	111
% change	79.8	15.0	1325.0	39.0	59.4	128.7	5.5	-3.9	52.5	370.0

Δ = change

Source: Mountain West Research, Inc.

TABLE IV-5

REGIONAL DISTRIBUTION OF POPULATION, 1970-1990
ALTERNATIVE FUTURE 3

Year	Rosebud County	Forsyth	Colstrip	Rosebud	Lame Deer	Ashland	North	Central	Reservation	South
1970	6032	1873	200	100	1100	436	491	803	999	30
1971	6824	1982	643	119	1118	496	496	943	997	30
1972	7146	2031	737	122	1116	556	501	1083	970	30
1973	10291	2564	2834	163	1127	616	506	1490	961	30
1974	11351	2734	3503	176	1142	676	511	1620	957	30
1975	10408	2558	2808	163	1160	736	516	1484	953	30
1976	9515	2412	2159	150	1176	797	521	1321	949	30
1977	12149	2787	3669	185	1208	824	526	1223	980	747
1978	13287	2899	5070	204	1242	851	531	911	1014	565
1979	14538	3150	6032	226	1280	864	532	930	1052	472
1980	12682	2712	4366	184	1319	877	533	901	1091	699
1981	11296	2252	2803	145	1357	862	507	824	1128	916
1982	10867	2184	2779	140	1398	877	509	845	1170	965
1983	12813	2476	4295	159	1441	893	511	842	1213	983
1984	12984	2574	4788	164	1484	910	515	838	1256	455
1985	17026	2886	6379	185	1527	927	519	834	1299	2474
1986	18420	2834	6554	181	1570	923	501	761	1340	3756
1987	17416	2528	4936	161	1613	939	505	761	1384	4689
1988	14437	2104	2702	135	1660	959	509	762	1430	4177
1989	13249	2124	2755	137	1706	977	513	766	1476	2795
1990	11666	2155	2850	139	1754	997	518	771	1524	958
Δ1970-1990	5634	282	2650	39	654	561	27	-32	525	928
% change	93.4	15.0	1325.0	39.0	59.4	128.7	5.5	-3.9	52.5	3093.3

Δ = change

Source: Mountain West Research, Inc.

TABLE IV-6

REGIONAL DISTRIBUTION OF POPULATION, 1970-1990
ALTERNATIVE FUTURE 4

Year	Rosebud County	Forsyth	Colstrip	Rosebud	Lame Deer	Ashland	North	Central	Reservation	South
1970	6032	1873	200	100	1100	436	491	803	999	30
1971	6824	1982	643	119	1118	496	496	943	997	30
1972	7146	2031	737	122	1116	556	501	1083	970	30
1973	10291	2564	2834	163	1127	616	506	1490	961	30
1974	11351	2734	3503	176	1142	676	511	1620	957	30
1975	10408	2558	2808	163	1160	736	516	1484	953	30
1976	9515	2412	2159	150	1176	797	521	1321	949	30
1977	11480	2787	3669	185	1208	824	526	1223	980	78
1978	12786	2899	5070	204	1242	851	531	911	1014	64
1979	14125	3150	6032	226	1280	864	532	930	1052	59
1980	12547	2810	4547	184	1319	1087	533	901	1091	75
1981	11244	2408	3090	145	1357	1196	507	824	1128	87
1982	11387	2476	3283	140	1398	1463	509	845	1170	123
1983	13310	2751	4804	159	1441	1484	511	842	1213	105
1984	13493	2749	5434	164	1484	1285	515	838	1256	91
1985	16393	3216	6990	185	1527	1637	519	834	1299	187
1986	16623	3170	7175	181	1570	1645	501	761	1340	280
1987	15303	2973	5759	161	1613	1895	505	761	1384	352
1988	12343	2449	3340	135	1660	1700	509	762	1430	359
1989	11548	2288	3058	137	1706	1329	513	766	1476	275
1990	11676	2320	3156	139	1754	1353	518	771	1524	141
Δ1970-1990	5644	447	2956	39	654	917	27	-32	525	111
% change	93.6	23.9	1478.0	39.0	59.4	210.3	5.5	-3.9	52.5	370.0

Δ = change

Source: Mountain West Research, Inc.

TABLE IV-7

REGIONAL DISTRIBUTION OF POPULATION, 1970-1990
ALTERNATIVE FUTURE 5

Year	Rosebud County	Forsyth	Colstrip	Rosebud	Lame Deer	Ashland	North	Central	Reservation	South
1970	6032	1873	200	100	1100	436	491	803	999	30
1971	6824	1982	643	119	1118	496	496	943	997	30
1972	7146	2031	737	122	1116	556	501	1083	970	30
1973	10291	2564	2834	163	1127	616	506	1490	961	30
1974	11351	2734	3503	176	1142	676	511	1620	957	30
1975	10408	2558	2808	163	1160	736	516	1484	953	30
1976	9515	2412	2159	150	1176	797	521	1321	949	30
1977	11480	2787	3669	185	1208	824	526	1223	980	78
1978	12786	2899	5070	204	1242	851	531	911	1014	64
1979	14125	3150	6032	226	1280	864	532	930	1052	59
1980	11157	2810	4547	184	1319	1087	533	901	1091	75
1981	11244	2408	3090	145	1357	1196	507	824	1128	87
1982	11387	2476	3283	140	1398	1463	509	845	1170	123
1983	13310	2751	4804	159	1441	1484	511	842	1213	105
1984	13493	2749	5434	164	1484	1285	515	838	1256	91
1985	16393	3216	6990	185	1527	1637	519	834	1299	187
1986	18652	3576	7926	181	1570	2517	501	761	1340	280
1987	18819	3676	7060	161	1613	3407	505	761	1384	352
1988	21089	4197	6574	135	1660	5459	509	762	1430	359
1989	17457	3470	5244	137	1706	3870	513	766	1476	275
1990	14080	2801	4045	139	1754	2387	518	771	1524	141
Δ1970-1990	8048	928	3845	39	654	1951	27	-32	525	111
% change	133.4	49.5	2022.5	39.0	59.4	447.5	5.5	-3.9	52.5	370.0

Δ = change

Source: Mountain West Research, Inc.

TABLE IV-8

ANALYSIS OF POPULATION CHANGE

	Peak Population	Year of Peak	Average 1970-1990 Population	1990 Population	Peak/ Average	Peak/ 1990 Population
Rosebud County						
Baseline	11351	1974	8553	9045	1.33	1.25
AF1	13904	1979	9676	9594	1.44	1.45
AF2	14944	1986	11049	10849	1.35	1.38
AF3	18420	1986	12114	11666	1.52	1.58
AF4	16623	1986	11708	11676	1.42	1.42
AF5	21089	1988	12716	14080	1.66	1.50
Forsyth						
Baseline	2734	1974	2066	1931	1.32	1.38
AF1	3119	1979	2266	1972	1.41	1.58
AF2	2899	1978	2467	2155	1.17	1.34
AF3	2899	1978	2467	2155	1.17	1.34
AF4	3216	1985	2600	2320	1.24	1.39
AF5	4197	1988	2815	2801	1.49	1.50
Colstrip						
Baseline	3503	1974	1522	1352	2.30	2.42
AF1	5873	1979	2423	1901	2.59	3.09
AF2	6554	1986	3470	2850	1.89	2.30
AF3	6554	1986	3470	2850	1.89	2.30
AF4	7175	1986	3728	3156	1.92	2.27
AF5	7926	1986	4126	4045	1.92	1.96

Source: Mountain West Research, Inc.

The lack of much variation between the six alternative futures through 1980 reflects the fact that, except for Colstrip units 3 and 4, no other large developments are expected in the county. It is doubtful that a new mine could be approved and constructed in order to begin mining during this period. Similarly, it is doubtful that construction could begin on a new power plant before 1980. With the current national trend away from nuclear power and toward fossil-fuel, the construction of two new coal-fired power plants (in addition to Colstrip 3 and 4) in the entire study area is a conservative estimate. However, given the conservative nature of the county residents and the existing state policy that implies that power plants should only be built to supply the needs of Montana, this assumption is defensible.

The economic pressures that have been and will be exerted on the Northern Cheyennes to develop their coal will continue to build. It is doubtful that they will be able to resist development, especially as their young people come into the labor force and unemployment increases. However, any development of this coal will be strongly controlled by the Northern Cheyenne people, thereby ensuring that the maximum number of their people will be employed.

The prospects for gasification do not look favorable since the scale of such a facility is untested and the high investment cost makes financing questionable. This outlook may change if the prices of competing fuels--oil and natural gas--rise to high levels and/or the federal government subsidizes the project.

For the reasons given above, the most probable alternatives are AF1, AF2, and AF4, and, of these three, AF4 is the most likely. It should be kept in mind that no specific prediction is being made, only that these represent the best estimates of future activity.

CHAPTER V

SUMMARY AND CONCLUSIONS

This report has provided a summary of the historical economic and demographic trends of Rosebud County. This historical information was used to develop sets of projections of employment and population given various development alternatives. Parts of the discussion have necessarily been long and complex; therefore, the major conclusions of the study are summarized below.

(1) During the past two decades, Rosebud County has experienced a loss of population as a result of declining employment in the agricultural and railroad industries.

(2) The period between 1970 and 1976 was dominated by construction activity associated with Colstrip 1 and 2. This project has caused substantial growth both in employment and in population.

(3) Rosebud County can expect large fluctuations in population as a result of large-scale energy development. This activity could cause temporary population growth of 30-50 percent and result in substantial problems in planning for and controlling growth in the county.

(4) Without further coal development, the Anglo population of the county will stabilize around 5500. Forsyth will show limited growth from its 1970 population once the construction activity at Colstrip is completed. The majority of the population growth will be centered in Colstrip.

(5) The long-term impact of the construction of Colstrip 3 and 4 will cause an influx of approximately 500 more persons into the county with most of them locating in Colstrip. The temporary influx of persons during the construction phase of the project could cause greater problems than those experienced during the construction of Colstrip 1 and 2, since much of the excess capacity in public and private facilities in the county has now been

utilized. The expected withdrawal of Western Energy from direct management of the town of Colstrip will place greater burdens on the county infrastructure.

(6) Given the present level of activity in the southern part of the county, little growth is expected; however, if developments result from the present exploration activities and if the road network is improved, substantial population growth could occur.

(7) The demographic structure and likely fertility behavior of the Northern Cheyenne imply a young and rapidly growing population. There has been under-utilization of the Northern Cheyenne labor force in the past, and rapid growth of the population will accentuate this problem. Except for limited expansion of the timber industry on the reservation, there is no sector, other than coal development, that could provide enough jobs to fully utilize the Northern Cheyenne labor force and provide sufficient income to increase the per capita income of the Northern Cheyenne people.

(8) The Northern Cheyenne population will grow rapidly, presenting problems in supplying public services on and near the reservation. Much of the growth will be centered in Lame Deer.

(9) Without development of Northern Cheyenne coal, the per capita income of the people will fall as the population expands. Short-term increase may occur due to construction activity off the reservation.

(10) The town of Ashland should grow considerably, especially if the Northern Cheyenne develop their coal resources.

(11) The northern part of the county is not expected to have any appreciable growth in the forseeable future.

APPENDIX A

TABLE A-1

BASELINE ALTERNATIVE

Year	Construction Workers	Permanent Workers	Railroad Workers
1973	750	311	5
1974	994	331	5
1975	625	433	10
1976	450	448	15
1977	225	453	20
1978	-	453	20
1979	-	453	20
1980	-	453	20
1981	-	453	20
1982	-	453	20
1983	-	453	20
1984	-	453	20
1985	-	453	20
1986	-	453	20
1987	-	453	20
1988	-	453	20
1989	-	453	20
1990	-	453	20

Source: Derived.

TABLE A-2

ALTERNATIVE FUTURE 1

Year	Baseline		Colstrip 3 & 4		Total		
	Construction Workers	Permanent Workers	Construction Workers	Permanent Workers	Construction Workers	Permanent Workers	Railroad Workers
1973	750	311	-	-	750	311	5
1974	994	331	-	-	994	331	5
1975	675	433	-	-	675	433	10
1976	450	448	-	-	450	448	15
1977	225	453	575	155	800	608	25
1978	-	453	1050	255	1050	708	25
1979	-	453	1387	348	1387	801	25
1980	-	453	750	348	750	801	25
1981	-	453	225	348	225	801	25
1982	-	453	-	348	-	801	25
1983	-	453	-	348	-	801	25
1984	-	453	-	348	-	801	25
1985	-	453	-	348	-	801	25
1986	-	453	-	348	-	801	25
1987	-	453	-	348	-	801	25
1988	-	453	-	348	-	801	25
1989	-	453	-	348	-	801	25
1990	-	453	-	348	-	801	25

Source: Derived.

TABLE A-3

ALTERNATIVE FUTURE 2

Year	AF1		Peabody Expansion		Mine--Central		Power Plant--Central		Decker Expansion		Birney-Decker M1		Birney-Decker M2		Birney-Decker Power Plant		Total		Rail road-
	C.W.[a]	P.W.[b]	C.W.	P.W.	C.W.	P.W.	C.W.	P.W.	C.W.	P.W.	C.W.	P.W.	C.W.	P.W.	C.W.	P.W.	C.W.	P.W.	
1973	750	311	-	-	-	-	-	-	-	-	-	-	-	-	-	-	750	311	5
1974	994	331	-	-	-	-	-	-	-	-	-	-	-	-	-	-	994	331	5
1975	675	433	-	-	-	-	-	-	-	-	-	-	-	-	-	-	675	433	10
1976	450	448	-	-	-	-	-	-	11	-	-	-	-	-	-	-	461	448	15
1977	800	608	37	-	-	-	-	-	11	10	-	-	-	-	-	-	848	618	20
1978	1050	708	15	52	-	-	-	-	3	12	-	-	-	-	-	-	1068	772	20
1979	1387	801	-	52	-	-	-	-	-	13	-	-	-	-	-	-	1387	866	20
1980	750	801	-	52	90	15	-	-	-	13	6	1	-	-	-	-	846	882	20
1981	225	801	-	52	170	15	-	-	-	13	11	1	-	-	-	-	406	882	25
1982	-	801	-	52	170	110	-	-	-	13	11	7	-	-	-	-	181	983	25
1983	-	801	-	52	90	215	544	7	-	13	6	14	-	-	-	-	640	1102	25
1984	-	801	-	52	-	215	888	14	-	13	-	14	-	-	-	-	888	1109	25
1985	-	801	-	52	-	215	1462	22	-	13	-	14	6	-	36	-	1504	1117	25
1986	-	801	-	52	-	215	1462	37	-	13	-	14	11	-	72	-	1545	1132	25
1987	-	801	-	52	-	215	881	135	-	13	-	14	11	6	97	1	989	1237	25
1988	-	801	-	52	-	215	-	135	-	13	-	14	6	13	97	2	103	1245	25
1989	-	801	-	52	-	215	-	135	-	13	-	14	-	13	59	9	59	1252	25
1990	-	801	-	52	-	215	-	135	-	13	-	14	-	13	-	9	-	1252	25

[a] C.W. = construction workers
[b] P.W. = permanent workers

Source: Derived.

TABLE A-4

ALTERNATIVE FUTURE 3

Year	AF1 C.W.[a]	AF1 P.W.[b]	Peabody Expansion C.W.	Peabody Expansion P.W.	Mine--Central C.W.	Mine--Central P.W.	Power Plant--Central C.W.	Power Plant--Central P.W.	Decker Expansion C.W.	Decker Expansion P.W.	Birney-Decker M1 C.W.	Birney-Decker M1 P.W.	Birney-Decker M2 C.W.	Birney-Decker M2 P.W.	Birney Decker Power Plant C.W.	Birney Decker Power Plant P.W.	Total C.W.	Total P.W.	Railroad
1973	750	311	-	-	-	-	-	-	-	-	-	-	-	-	-	-	750	311	5
1974	994	331	-	-	-	-	-	-	-	-	-	-	-	-	-	-	994	331	5
1975	675	433	-	-	-	-	-	-	-	-	-	-	-	-	-	-	675	433	10
1976	450	448	-	-	-	-	-	-	-	-	-	-	-	-	-	-	450	448	15
1977	800	608	37	-	-	-	-	-	110	100	-	-	-	-	-	-	837	608	20
1978	1050	708	15	52	-	-	-	-	30	120	-	-	-	-	-	-	1065	880	20
1979	1387	801	-	52	-	-	-	-	-	130	-	-	-	-	-	-	1387	983	20
1980	750	801	-	52	90	15	-	-	-	130	60	10	-	-	-	-	840	1008	20
1981	225	801	-	52	170	15	-	-	-	130	110	10	-	-	-	-	395	1008	25
1982	-	801	-	52	170	110	-	-	-	130	110	70	-	-	-	-	175	1163	25
1983	-	801	-	52	90	215	544	7	-	130	60	140	-	-	-	-	634	1345	25
1984	-	801	-	52	-	215	888	14	-	130	-	140	-	-	-	-	888	1352	25
1985	-	801	-	52	-	215	1462	22	-	130	-	140	60	10	360	-	1462	1370	25
1986	-	801	-	52	-	215	1462	37	-	130	-	140	110	10	720	-	1462	1385	25
1987	-	801	-	52	-	215	881	135	-	130	-	140	110	70	970	10	881	1553	25
1988	-	801	-	52	-	215	-	135	-	130	-	140	60	140	970	20	-	1633	25
1989	-	801	-	52	-	215	-	135	-	130	-	140	-	140	590	90	-	1703	25
1990	-	801	-	52	-	215	-	135	-	130	-	140	-	140	-	90	-	1703	25

[a] C.W. = construction workers
[b] P.W. = permanent workers

Source: Derived.

TABLE A-5

ALTERNATIVE FUTURE 4

Year	AF2 C.W.[a]	AF2 P.W.[b]	Northern Cheyenne M1 C.W.	Northern Cheyenne M1 P.W.	Northern Cheyenne M2 C.W.	Northern Cheyenne M2 P.W.	Total C.W.	Total P.W.	Railroad
1973	750	311	-	-	-	-	750	311	5
1974	994	331	-	-	-	-	994	331	5
1975	675	433	-	-	-	-	675	433	10
1976	461	448	-	-	-	-	461	448	15
1977	848	618	-	-	-	-	848	618	20
1978	1068	772	-	-	-	-	1068	772	20
1979	1387	866	-	-	-	-	1387	866	20
1980	846	882	120	20	-	-	966	902	20
1981	406	882	225	20	-	-	631	906	25
1982	181	983	225	150	-	-	406	1133	25
1983	640	1102	120	286	-	-	760	1388	25
1984	888	1109	-	286	-	-	888	1395	25
1985	1504	1117	-	286	120	20	1624	1423	25
1986	1545	1132	-	286	225	20	1770	1438	25
1987	989	1237	-	286	225	150	1214	1673	25
1988	103	1245	-	286	120	286	223	1817	25
1989	59	1252	-	286	-	286	59	1824	25
1990	-	1252	-	286	-	286	-	1824	25

[a] C.W. = construction workers
[b] P.W. = permanent workers

Source: Derived.

TABLE A-6

ALTERNATIVE FUTURE 5

Year	AF4 C.W.[a]	AF4 P.W.[b]	Gasification C.W.	Gasification P.W.	Total C.W.	Total P.W.	Railroad
1973	750	311	-	-	750	311	5
1974	994	331	-	-	994	331	5
1975	675	433	-	-	675	433	10
1976	461	448	-	-	461	448	15
1977	848	618	-	-	848	618	20
1978	1068	772	-	-	1068	772	20
1979	1387	866	-	-	1387	866	20
1980	966	902	-	-	966	902	20
1981	631	886	-	-	631	886	25
1982	406	1133	-	-	406	1133	25
1983	760	1388	-	-	760	1388	30
1984	888	1395	-	-	888	1395	30
1985	1624	1423	-	-	1624	1423	30
1986	1770	1438	500	-	2270	1438	30
1987	1214	1673	1000	25	2214	1698	35
1988	223	1817	1350	75	2573	1892	35
1989	59	1824	1250	400	1309	2224	35
1990	-	1824	325	425	325	2249	35

[a] C.W. = construction workers
[b] P.W. = permanent workers

Source: Derived.

TABLE A-7

BASELINE
CONSTANT LABOR FORCE PARTICIPATION RATES

Year	Population			Labor Force			Employment			Unemployment Rate		Population Change							
												Anglo				Northern Cheyenne			Study Area
	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Births	Deaths	Migration	Total Change	Births	Deaths	Total Change	Total Change
1971	5336	2536	7872	2298	704	3002	2145	660	2805	6.7	6.3	70	55	656	671	97	25	72	743
1972	5677	2611	8288	2436	723	3159	2286	686	2972	6.1	5.0	99	56	298	341	100	25	75	416
1973	8936	2694	11630	4001	751	4752	3758	713	4471	6.1	5.0	105	57	3196	3244	109	26	83	3327
1974	9987	2784	12771	4473	776	5249	4174	737	4911	6.7	5.0	165	67	951	1049	116	27	89	1138
1975	8999	2879	11878	4058	800	4858	3801	760	4561	6.3	5.0	179	71	-1095	-987	123	27	96	-891
1976	7986	2981	10967	3691	833	4524	3452	791	4243	6.5	5.0	131	68	-1060	-997	130	29	101	-896
1977	6942	3086	10028	3282	860	4142	3073	817	3890	6.4	5.0	99	66	-1077	-1044	135	30	105	-939
1978	6048	3197	9245	2939	869	3808	2745	776	3521	6.6	10.7	72	64	-902	-894	142	31	111	-783
1979	6042	3317	9359	2987	906	3893	2747	779	3526	8.1	14.0	56	62	0	-7	151	31	120	-113
1980	6043	3440	9482	3036	945	3981	2750	782	3532	9.4	17.3	65	63	0	2	155	32	123	125
1981	5749	3565	9314	2947	967	3914	2754	785	3539	6.6	18.8	75	65	-304	-294	158	33	125	-169
1982	5761	3700	9461	2974	1000	3974	2757	788	3545	7.3	21.2	77	64	0	12	169	34	135	147
1983	5782	3838	9620	2997	1041	4038	2760	791	3551	7.9	24.0	86	66	0	20	173	35	138	158
1984	5811	3976	9787	3018	1068	4086	2765	795	3560	8.4	25.6	96	67	0	29	173	36	137	166
1985	5848	4115	9963	3045	1091	4136	2768	798	3566	9.1	26.9	105	69	0	36	176	37	139	175
1986	5890	4259	10149	3051	1116	4167	2772	802	3574	9.1	28.2	112	70	0	42	181	38	144	186
1987	5936	4405	10341	3066	1144	4210	2777	805	3582	9.4	29.6	118	72	0	46	185	39	146	192
1988	5987	4557	10544	3069	1182	4251	2781	808	3589	9.4	31.6	123	73	0	50	192	40	152	202
1989	6041	4710	10751	3084	1228	4312	2787	812	3599	9.6	33.9	128	74	0	54	194	41	153	207
1990	6095	4865	10961	3084	1269	4353	2792	816	3608	9.4	35.7	130	75	0	55	196	42	155	210

Source: Mountain West Research, Inc., April, 1976.

TABLE A-8

ALTERNATIVE FUTURE 1
CONSTANT LABOR FORCE PARTICIPATION RATES

	Population			Labor Force			Employment			Unemployment Rate		Population Change								Change from Baseline				
												Anglo				Northern Cheyenne			Study Area					
Year	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Births	Deaths	Migration	Total Change	Births	Deaths	Total Change	Total Change	Δ Basic Emp	Δ Total Emp	ΔPop	ΔTE/ΔBE	ΔPOP/ΔBE
1971	5336	2536	7872	2298	704	3002	2145	660	2805	6.7	6.3	70	55	656	671	97	25	72	743	-	-	-	-	-
1972	5677	2611	8288	2436	723	3159	2286	686	2972	6.1	5.0	99	56	298	341	100	25	75	416	-	-	-	-	-
1973	8936	2694	11630	4001	751	4752	3758	713	4471	6.1	5.0	105	57	3211	3259	109	26	83	3342	-	-	-	-	-
1974	9987	2784	12771	4473	776	5249	4174	737	4911	6.7	5.0	166	67	952	1051	116	27	89	1140	-	-	-	-	-
1975	8999	2879	11878	4058	800	4858	3801	760	4561	6.3	5.0	179	71	-1096	-988	123	27	96	-892	-	-	-	-	-
1976	7986	2981	10967	3691	833	4524	3452	791	4243	6.5	5.0	131	68	-1077	-1014	130	29	101	-913	-	-	-	-	-
1977	9764	3086	12850	4575	860	5435	4292	817	5109	6.2	5.0	98	66	1746	1778	135	30	105	1883	778	1219	2822	1.57	3.63
1978	11015	3197	14212	5198	869	6067	4871	825	5696	6.3	5.0	132	72	1191	1251	142	31	111	1362	1310	2175	4967	1.66	3.79
1979	12420	3317	15737	5929	906	6835	5556	861	6417	6.3	5.0	157	77	1325	1405	151	31	120	1525	1740	2891	6378	1.66	3.66
1980	9707	3440	13147	4779	945	5724	4467	898	5365	6.5	5.0	187	83	-2816	-2712	155	32	123	-2589	1103	1933	3665	1.75	3.32
1981	7489	3565	11054	3858	967	4825	3580	919	4499	7.2	5.0	102	77	-2243	-2218	158	33	125	-2093	577	960	1740	1.66	3.01
1982	6505	3700	10205	3461	1000	4461	3246	885	4131	6.2	11.5	63	71	-976	-984	169	34	135	-849	353	586	744	1.66	2.11
1983	6483	3838	10321	3505	1041	4546	3249	888	4137	7.3	14.7	49	71	0	-22	173	35	138	117	353	586	701	1.66	1.98
1984	6471	3976	10447	3552	1068	4620	3253	892	4145	8.4	16.5	61	73	0	-12	173	36	137	125	353	585	660	1.66	1.87
1985	6469	4115	10584	3605	1091	4696	3256	895	4151	9.7	18.0	73	75	0	-2	176	37	139	137	353	585	621	1.66	1.76
1986	6116	4259	10375	3482	1116	4598	3261	898	4159	6.3	19.5	84	77	-361	-354	181	38	144	-210	353	585	226	1.66	.64
1987	6121	4405	10526	3520	1144	4664	3265	902	4167	7.2	21.1	84	78	0	5	185	39	146	151	353	585	185	1.66	.52
1988	6139	4557	10696	3529	1182	4711	3270	905	4175	7.4	23.4	98	80	0	18	192	40	152	170	353	586	152	1.66	.43
1989	6167	4710	10877	3559	1228	4787	3276	909	4185	8.0	26.0	109	82	0	27	194	41	153	180	353	586	126	1.66	.36
1990	6202	4865	11067	3568	1269	4837	3281	913	4194	8.0	28.0	119	84	0	35	196	42	154	189	353	586	106	1.66	.30

Source: Mountain West Research, Inc., April, 1976.

TABLE A-9

ALTERNATIVE FUTURE 2
CONSTANT LABOR FORCE PARTICIPATION RATES

Year	Population			Labor Force			Employment			Unemployment Rate		Population Change: Anglo				Population Change: Northern Cheyenne			Study Area Total Change	Change from Baseline				
	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Births	Deaths	Migration	Total Change	Births	Deaths	Total Change		Δ Basic Emp	Δ Total Emp	ΔPop	ΔTE/ΔBE	ΔPOP/ΔBE
1971	5336	2536	7872	2298	704	3002	2145	660	2805	6.7	6.3	70	55	656	671	97	25	72	743	-	-	-	-	-
1972	5677	2611	8288	2436	723	3159	2286	686	2972	6.1	5.0	99	56	298	341	100	25	75	416	-	-	-	-	-
1973	8936	2694	11630	4001	751	4752	3758	713	4471	6.1	5.0	105	57	3211	3259	109	26	83	3342	-	-	-	-	-
1974	9987	2784	12771	4473	776	5249	4174	737	4911	6.7	5.0	166	67	952	1051	116	27	89	1140	-	-	-	-	-
1975	8999	2879	11879	4058	800	4858	3801	760	4561	6.3	5.0	179	71	-1096	-988	123	27	96	-892	-	-	-	-	-
1976	8028	2981	11009	3710	833	4543	3470	791	4261	6.5	5.0	131	68	-1077	-1014	130	29	101	-913	10	18	42	1.64	3.83
1977	9962	3086	13048	4669	860	5529	4382	817	5199	6.1	5.0	100	66	1900	1934	135	30	105	2039	788	1309	3020	1.66	3.84
1978	11306	3197	14503	5335	869	6204	5000	825	5825	6.3	5.0	136	73	1281	1344	142	31	111	1454	1387	2304	5258	1.66	3.81
1979	12655	3317	15972	6039	906	6945	5657	861	6518	6.3	5.0	162	78	1266	1350	151	31	120	1470	1640	2992	6613	1.66	3.67
1980	10394	3440	13834	5093	945	6038	4754	898	5652	6.7	5.0	191	84	-2367	-2260	155	32	123	-2137	1799	2120	4352	1.64	3.36
1981	8529	3565	12094	4325	967	5292	4016	919	4935	7.2	5.0	122	79	-1908	-1865	158	33	125	-1740	765	1396	2780	1.66	3.31
1982	7801	3700	11501	4045	1000	5045	3784	950	4734	6.4	5.0	91	75	-744	-728	169	34	135	-593	839	1189	2040	1.42	2.47
1983	9739	3838	13577	5016	1041	6057	4712	989	5701	6.1	5.0	83	75	1930	1938	173	35	138	2076	1294	2150	3957	1.66	3.06
1984	10600	3976	14575	5472	1068	6540	5118	1014	6132	6.5	5.0	120	83	824	861	173	36	137	998	1549	2572	4788	1.66	3.09
1985	12760	4115	16875	6560	1091	7651	6139	1036	7175	6.4	5.0	144	88	2104	2160	176	37	139	2299	2172	3609	6912	1.66	3.18
1986	12858	4259	17117	6645	1116	7761	6217	1060	7277	6.4	5.0	194	97	0	97	181	38	144	241	2237	3703	6968	1.66	3.13
1987	10941	4405	15345	5823	1144	6967	5450	1087	6537	6.4	5.0	207	100	-2024	-1917	185	39	146	-1771	1777	2955	5004	1.66	2.82
1988	7405	4557	11962	4278	1182	5460	4029	1056	5085	5.8	10.7	147	97	-3586	-3536	192	40	152	-3384	900	1496	1418	1.66	1.58
1989	7357	4710	12068	4321	1228	5549	3984	1050	5034	7.8	14.6	42	90	0	-48	194	41	153	105	862	1435	1317	1.67	1.53
1990	7320	4865	12185	4332	1269	5601	3907	1037	4944	9.8	18.3	55	92	0	-37	196	42	154	117	804	1336	1224	1.66	1.52

Source: Mountain West Research, Inc., April, 1976.

TABLE A-10

ALTERNATIVE FUTURE 3
CONSTANT LABOR FORCE PARTICIPATION RATES

	Population			Labor Force			Employment			Unemployment Rate		Population Change								Change from Baseline				
												Anglo				Northern Cheyenne			Study Area					
Year	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Births	Deaths	Migration	Total Change	Births	Deaths	Total Change	Total Change	Δ Basic Emp	Δ Total Emp	ΔPop	ΔTE/ΔBE	ΔPOP/ΔBE
1971	5336	2536	7872	2298	704	3002	2145	660	2805	6.7	6.3	70	55	656	671	97	25	72	743	-	-	-	-	-
1972	5677	2611	8288	2436	723	3159	2286	686	2972	6.1	5.0	99	56	298	341	100	25	75	416	-	-	-	-	-
1973	8936	2694	11630	4001	751	4752	3758	713	4471	6.1	5.0	105	57	3196	3244	109	26	83	3327	-	-	-	-	-
1974	9987	2784	12771	4473	776	5249	4174	737	4911	6.7	5.0	165	67	951	1049	116	27	89	1138	-	-	-	-	-
1975	8999	2879	11878	4058	800	4858	3801	760	4561	6.3	5.0	179	71	-1095	-987	123	27	96	-891	-	-	-	-	-
1976	7986	2981	10967	3691	833	4524	3452	791	4243	6.5	5.0	131	68	-1077	-1014	130	29	101	-976	-	-	-	-	-
1977	10633	3086	13719	4995	860	5855	4696	817	5513	6.0	5.0	98	66	2214	2246	135	30	105	2319	977	1623	3691	1.66	3.78
1978	11830	3197	15027	5583	869	6452	5224	825	6049	6.4	5.0	145	75	1128	1198	142	31	111	1239	1522	2528	5782	1.66	3.80
1979	13093	3317	16410	6247	906	7153	5851	861	6712	6.3	5.0	170	80	1173	1263	151	31	120	1293	1917	3186	7051	1.66	3.68
1980	11061	3440	14501	5411	945	6356	5053	898	5951	6.6	5.0	198	85	-2146	2033	155	32	123	-2023	1455	2419	5018	1.66	3.45
1981	9574	3565	13139	4816	967	5783	4473	919	5392	7.1	5.0	137	81	-1543	-1487	158	33	125	-1418	1115	1853	3825	1.66	3.43
1982	8886	3700	12586	4551	1000	5551	4256	950	5206	6.5	5.0	115	78	-725	-688	169	34	135	-590	1000	1661	3125	1.66	3.12
1983	10866	3838	14704	5541	1041	6582	5206	989	6195	6.1	5.0	107	79	1952	1980	173	35	138	2090	1591	2644	5084	1.66	3.19
1984	11553	3976	15529	5908	1068	6976	5522	1014	6536	6.5	5.0	145	87	629	687	173	36	137	766	1792	2976	5742	1.66	3.20
1985	15151	4115	19266	7683	1091	8774	7188	1036	8224	6.4	5.0	167	91	3522	3598	176	37	139	3661	2804	4658	9303	1.66	3.32
1986	16730	4259	20989	8427	1116	9533	7879	1060	8939	6.5	5.0	246	105	1437	1578	181	38	144	1581	3229	5365	10840	1.66	3.36
1987	15887	4405	20292	8114	1144	9258	7591	1087	8678	6.4	5.0	277	113	-1008	-842	185	39	146	-862	3066	5096	9951	1.66	3.24
1988	12361	4557	16918	6563	1182	7745	6147	1123	7270	6.3	5.0	257	113	-3669	-3525	192	40	152	-3517	2215	3631	6374	1.64	2.88
1989	10554	4710	15264	5899	1228	7127	5499	1167	6666	6.8	5.0	141	107	-1841	-1807	194	41	153	-1688	1845	3067	4513	1.66	2.45
1990	8134	4865	12999	4822	1269	6091	4533	1161	5694	6.0	8.5	119	104	-2435	-2420	196	42	155	-2280	1255	2086	2039	1.66	1.62

Source: Mountain West Research, Inc., April, 1976.

TABLE A-11

ALTERNATIVE FUTURE 4
CONSTANT LABOR FORCE PARTICIPATION RATES

Year	Population			Labor Force			Employment			Unemployment Rate		Population Change: Anglo				Population Change: Northern Cheyenne			Study Area Total Change	Change from Baseline				
	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Births	Deaths	Migration	Total Change	Births	Deaths	Total Change		Δ Basic Emp	Δ Total Emp	ΔPop	ΔTE/ΔBE	ΔPOP/ΔBE
1971	5336	2536	7872	2298	704	3002	2145	660	2805	6.7	6.3	70	55	656	671	97	25	72	743	-	-	-	-	-
1972	5677	2611	8288	2436	723	3159	2286	686	2972	6.1	5.0	99	56	298	341	100	25	75	416	-	-	-	-	-
1973	8936	2694	11630	4001	751	4752	3758	713	4471	6.1	5.0	105	57	3196	3244	109	26	83	3327	-	-	-	-	-
1974	9987	2784	12771	4473	776	5249	4174	737	4911	6.7	5.0	165	67	951	1049	116	27	89	1138	-	-	-	-	-
1975	8999	2879	11878	4058	800	4858	3801	760	4561	6.3	5.0	179	71	-1095	-987	123	27	96	-891	-	-	-	-	-
1976	8028	2981	11009	3710	833	4543	3470	791	4261	6.5	5.0	131	68	-1060	-997	130	29	101	-896	11	18	42	1.64	3.83
1977	9962	3086	13048	4669	860	5529	4382	817	5199	6.1	5.0	100	66	1900	1934	135	30	105	2039	779	1309	3020	1.68	3.87
1978	11306	3197	14503	5335	869	6204	5000	825	5825	6.3	5.0	136	73	1281	1344	142	31	111	1455	1387	2304	5258	1.66	3.79
1979	12655	3317	15972	6039	906	6945	5657	861	6518	6.3	5.0	162	78	1266	1350	151	31	120	1470	1799	2992	6613	1.66	3.67
1980	10927	3440	14367	5339	945	6284	4986	898	5884	6.6	5.0	191	84	-1835	-1728	155	32	123	-1605	1415	2352	4885	1.66	3.45
1981	9498	3565	13063	4759	967	5726	4430	919	5349	6.9	5.0	141	81	-1488	-1428	158	33	125	-1303	1088	1810	3749	1.66	3.45
1982	9535	3700	13235	4803	1000	5803	4407	950	5357	8.3	5.0	114	78	0	36	169	34	135	171	1091	1812	3774	1.66	3.46
1983	11419	3838	15257	5744	1041	6785	5394	989	6383	6.1	5.0	125	80	1839	1884	173	35	138	2022	1705	2832	5637	1.66	3.31
1984	11494	3976	15470	5839	1068	6907	5600	1014	6614	4.1	5.0	163	88	0	75	173	36	137	212	1840	3054	5683	1.66	3.06
1985	14484	4115	18599	7309	1091	8400	6854	1036	7890	6.2	5.0	176	90	2905	2991	176	37	139	3130	2373	4324	8636	1.66	3.32
1986	14614	4259	18873	7407	1116	8523	7107	1060	8167	4.1	5.0	233	103	0	130	181	38	144	274	2604	4593	8724	1.66	3.15
1987	13597	4405	18002	7015	1144	8159	6563	1087	7650	6.4	5.0	245	105	-1157	-1017	185	39	146	-871	2449	4068	7661	1.66	3.13
1988	10105	4557	14662	5474	1182	6656	5126	1123	6249	6.4	5.0	219	105	-3605	-3491	192	40	152	-3339	1602	2660	4118	1.66	2.57
1989	9048	4710	13758	5147	1228	6375	4831	1167	5998	6.1	5.0	100	99	-1059	-1058	194	41	153	-905	1445	2399	3007	1.66	2.08
1990	9038	4865	13903	5169	1269	6438	4703	1205	4908	9.0	5.0	88	98	0	-10	196	42	155	145	1386	1300	2942	.94	2.03

Source: Mountain West Research, Inc., April, 1976.

TABLE A-12

ALTERNATIVE FUTURE 5
CONSTANT LABOR FORCE PARTICIPATION RATES

	Population			Labor Force			Employment			Unemployment Rate		Population Change: Anglo				Population Change: Northern Cheyenne			Study Area	Change from Baseline				
Year	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Births	Deaths	Migration	Total Change	Births	Deaths	Total Change	Total Change	Δ Basic Emp	Δ Total Emp	ΔPop	ΔTE/ΔBE	ΔPOP/ΔBE
1971	5336	2536	7872	2298	704	3002	2145	660	2805	6.7	6.3	70	55	656	671	97	25	72	743	-	-	-	-	-
1972	5677	2611	8288	2436	723	3159	2286	686	2972	6.1	5.0	90	56	298	341	100	25	75	416	-	-	-	-	-
1973	8936	2694	11630	4001	751	4752	3758	713	4471	6.1	5.0	105	57	3211	3259	109	26	83	3342	-	-	-	-	-
1974	9987	2784	12771	4473	776	5249	4174	737	4911	6.7	5.0	166	67	952	1051	116	27	89	1140	-	-	-	-	-
1975	8999	2879	11878	4058	800	4858	3801	760	4561	6.3	5.0	179	71	-1096	-988	123	27	96	-892	-	-	-	-	-
1976	8028	2981	11009	3710	833	4543	3470	791	4261	6.5	5.0	131	68	-1077	-1014	130	29	101	-913	11	18	42	1.64	3.83
1977	9962	3086	13048	4669	860	5529	4382	817	5199	6.1	5.0	100	66	1900	1934	135	30	105	2039	779	1309	3020	1.68	3.87
1978	11306	3197	14503	5335	869	6204	5000	825	5825	6.3	5.0	136	73	1281	1344	142	31	111	1455	1387	2304	5258	1.66	3.79
1979	12655	3317	15972	6039	906	6945	5657	861	6518	6.3	5.0	162	78	1266	1350	151	31	120	1470	1799	2992	6613	1.66	3.67
1980	10927	3440	14367	5339	945	6284	4986	898	5884	6.6	5.0	191	84	-1835	-1728	155	32	123	-1605	1415	2352	4885	1.66	3.45
1981	9498	3565	13063	4759	967	5726	4430	919	5349	6.9	5.0	141	81	-1488	-1428	158	33	125	-1303	1088	1810	3749	1.66	3.45
1982	9535	3700	13235	4803	1000	5803	4407	950	5357	8.3	5.0	114	78	0	37	169	34	135	162	1091	1812	3774	1.66	3.46
1983	11419	3838	15257	5744	1041	6785	5394	989	6383	6.1	5.0	125	80	1839	1884	173	35	138	2022	1705	2832	5637	1.66	3.31
1984	11494	3976	15470	5839	1068	6907	5600	1014	6614	4.1	5.0	163	88	0	75	173	36	137	212	1840	3054	5683	1.66	3.06
1985	14484	4115	18599	7309	1091	8400	6854	1036	7890	6.2	5.0	176	90	2905	2991	176	37	139	3030	2373	4324	8636	1.66	3.32
1986	16878	4259	21137	8467	1116	9583	7938	1060	8998	6.3	5.0	233	103	2264	2394	181	38	144	2538	3265	5424	10988	1.66	3.36
1987	17038	4405	21443	8603	1144	9747	8265	1087	9352	3.9	5.0	273	113	0	160	185	39	146	306	3474	5770	11102	1.66	3.20
1988	19435	4557	23992	9771	1182	10953	9155	1123	10278	6.3	5.0	290	115	2223	2397	192	40	152	2549	4027	6689	13448	1.66	3.34
1989	15572	4710	20282	8090	1228	9318	7574	1167	8741	6.4	5.0	336	126	-4073	-3863	194	41	153	-4016	3095	5142	9531	1.66	3.08
1990	11453	4865	16318	6372	1269	7641	5950	1205	7155	6.6	5.0	200	120	-4200	-4120	196	42	154	-4274	2136	3547	5357	1.66	2.51

Source: Mountain West Research, Inc., April, 1976.

TABLE A-13

BASELINE
CONVERGING LABOR FORCE PARTICIPATION RATES

	Population			Labor Force			Employment			Unemployment Rate		Population Change							
												Anglo				Northern Cheyenne			Study Area
Year	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Births	Deaths	Migration	Total Change	Births	Deaths	Total Change	Total Change
1971	5317	2536	7853	2298	716	3014	2145	660	2805	6.7	7.8	70	55	636	651	97	25	72	723
1972	5602	2611	8213	2420	747	3167	2265	707	2972	6.4	5.4	98	56	243	285	100	25	75	360
1973	8681	2694	11361	3939	788	4727	3716	748	4464	5.6	5.0	103	57	3034	3080	109	26	83	3163
1974	9664	2784	12432	4424	826	5250	4120	785	4905	6.9	5.0	145	67	904	982	116	27	89	1071
1975	8643	2879	11522	3986	865	4851	3731	822	4553	6.4	5.0	161	70	-1111	-1020	123	27	96	-924
1976	7675	2981	10656	3624	911	4535	3378	865	4243	6.8	5.0	121	67	-1007	-953	130	29	101	-867
1977	6829	3086	9915	3278	953	4231	3055	835	3890	6.8	12.4	98	65	-879	-846	135	30	105	-741
1978	6005	3197	9203	2938	985	3923	2745	776	3521	6.6	21.2	81	63	-841	-823	142	31	111	-712
1979	6009	3317	9326	2994	1038	4032	2747	779	3526	8.2	24.9	65	62	0	3	151	31	120	123
1980	6019	3440	9459	3043	1089	4132	2750	782	3532	9.6	28.2	73	63	0	10	155	32	123	133
1981	5733	3565	9298	2947	1136	4083	2754	785	3539	6.5	30.9	82	64	-304	-286	158	33	125	-161
1982	5753	3700	9453	2978	1184	4162	2757	788	3545	7.4	33.4	83	64	0	19	169	34	135	154
1983	5779	3838	9618	3007	1236	4243	2760	791	3551	8.2	36.0	92	65	0	27	173	35	138	165
1984	5813	3976	9789	3027	1283	4310	2765	795	3560	8.7	38.1	101	66	0	35	173	36	137	172
1985	5854	4115	9969	3057	1331	4388	2768	798	3556	9.5	40.0	108	68	0	40	176	37	139	179
1986	5660	4259	9918	2962	1378	4340	2772	802	3574	6.4	41.8	114	69	-239	-194	181	38	144	-50
1987	5699	4405	10104	2985	1438	4423	2777	805	3582	7.0	44.0	110	70	0	40	185	39	146	186
1988	5742	4557	10299	2990	1499	4489	2781	808	3589	7.0	46.1	114	71	0	43	192	40	152	195
1989	5788	4710	10499	3006	1566	4572	2787	812	3599	7.3	48.1	118	72	0	46	194	41	153	199
1990	5835	4865	10700	2994	1619	4613	2792	816	3608	6.8	49.6	120	73	0	47	196	42	154	201

Source: Mountain West Research, Inc., April, 1976.

TABLE A-14

ALTERNATIVE FUTURE 1
CONVERGING LABOR FORCE PARTICIPATION RATES

	Population			Labor Force			Employment			Unemployment Rate		Population Change: Anglo				Population Change: Northern Cheyenne			Study Area	Change from Baseline				
Year	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Births	Deaths	Migration	Total Change	Births	Deaths	Total Change	Total Change	Δ Basic Emp	Δ Total Emp	ΔPop	ΔTE/ΔBE	ΔPOP/ΔBE
1971	5317	2536	7853	2298	716	3014	2145	660	2805	6.7	7.8	70	55	636	651	97	25	72	723	-	-	-	-	-
1972	5602	2611	8213	2420	747	3167	2265	707	2972	6.4	5.4	98	56	243	285	100	25	75	360	-	-	-	-	-
1973	8681	2694	11376	3946	788	4734	3723	748	4471	5.6	5.0	103	57	3034	3080	109	26	83	3163	-	-	-	-	-
1974	9664	2784	12447	4432	826	5258	4127	785	4912	6.9	5.0	145	67	904	982	116	27	89	1071	-	-	-	-	-
1975	8643	2879	11523	3994	865	4859	3738	822	4560	6.4	5.0	161	70	-1111	-1020	123	27	96	-924	-	-	-	-	-
1976	7675	2981	10656	3625	911	4536	3378	865	4243	6.8	5.0	121	67	-1022	-968	130	29	101	-867	-	-	-	-	-
1977	9369	3086	12455	4501	953	5454	4203	906	5109	6.6	5.0	97	65	1661	1693	135	30	105	1798	778	1219	2540	1.57	3.26
1978	10507	3197	13704	5107	985	6092	4760	936	5696	6.8	5.0	127	71	1083	1139	142	31	111	1250	1310	2175	4502	1.66	3.44
1979	11811	3317	15128	5825	1038	6863	5431	986	6417	6.8	5.0	153	76	1228	1305	151	31	120	1425	1740	2891	5802	1.66	3.33
1980	9248	3440	12688	4645	1089	5734	4330	1034	5364	6.8	5.0	181	81	-2663	-2563	155	32	123	-2440	1103	1933	3225	1.75	2.92
1981	7405	3565	10970	3830	1136	4966	3555	944	4499	7.2	16.9	113	75	-1881	-1843	158	33	125	-1718	577	960	1672	1.66	2.90
1982	6563	3700	10263	3469	1184	4653	3246	885	4131	6.4	25.3	81	71	-853	-843	169	34	135	-708	353	586	810	1.66	2.29
1983	6562	3838	10400	3516	1236	4752	3249	888	4137	7.6	28.2	70	70	0	0	173	35	138	138	353	586	783	1.66	2.22
1984	6569	3976	10545	3555	1283	4838	3253	892	4145	8.5	30.5	79	72	0	7	173	36	137	144	353	585	756	1.66	2.14
1985	6583	4115	10698	3605	1331	4936	3256	895	4151	9.7	32.8	88	74	0	14	176	37	139	153	353	585	729	1.66	2.07
1986	6259	4259	10518	3479	1378	4857	3261	898	4159	6.3	34.8	98	76	-346	-324	181	38	144	-180	353	585	599	1.66	1.70
1987	6278	4405	10683	3517	1438	4955	3265	902	4167	7.2	37.3	96	77	0	19	185	39	146	165	353	585	579	1.66	1.64
1988	6306	4557	10864	3532	1499	5031	3270	905	4175	7.4	39.6	107	79	0	28	192	40	152	180	353	586	564	1.66	1.60
1989	6342	4710	11053	3556	1566	5122	3276	909	4185	7.9	41.9	116	80	0	36	194	41	153	189	353	586	554	1.66	1.57
1990	6384	4865	11249	3551	1619	5170	3281	913	4194	7.6	43.6	124	82	0	42	196	42	154	196	353	586	549	1.66	1.56

Source: Mountain West Research, Inc., April, 1976.

TABLE A-15

ALTERNATIVE FUTURE 2
CONVERGING LABOR FORCE PARTICIPATION RATES

	Population			Labor Force			Employment			Unemployment Rate		Population Change								Change from Baseline				
												Anglo				Northern Cheyenne			Study Area					
Year	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Births	Deaths	Migration	Total Change	Births	Deaths	Total Change	Total Change	Δ Basic Emp	Δ Total Emp	ΔPop	ΔTE/ΔBE	ΔPOP/ΔBE
1971	5317	2536	7853	2298	716	3014	2145	660	2805	6.7	7.8	70	55	636	651	97	25	72	738	-	-	-	-	-
1972	5602	2611	8213	2420	747	3167	2265	707	2972	6.4	5.4	98	56	243	285	100	25	75	360	-	-	-	-	-
1973	8681	2694	11375	3946	788	4734	3723	748	4471	5.6	5.0	103	57	3034	3080	109	26	83	3163	-	-	-	-	-
1974	9664	2784	12448	4432	826	5258	4127	785	4912	6.9	5.0	145	67	904	982	116	27	89	1073	-	-	-	-	-
1975	8643	2879	11523	3994	865	4859	3738	822	4560	6.4	5.0	101	70	-1177	-1020	123	27	96	-924	-	-	-	-	-
1976	7713	2981	10694	3643	911	4554	3396	865	4261	6.8	5.0	121	67	-1022	-968	130	29	101	-867	10	18	38	1.64	3.80
1977	9562	3086	12648	4597	953	5550	4293	906	5199	6.6	5.0	99	65	1815	1849	135	30	105	1954	788	1309	2733	1.66	3.47
1978	10788	3197	13985	5247	988	6235	4890	936	5826	6.8	5.0	130	72	1169	1227	142	31	111	1338	1387	2304	4783	1.66	3.45
1979	12032	3317	15349	5933	1038	6971	5532	986	6518	6.8	5.0	157	57	1164	1244	151	31	120	1364	1640	2992	6023	1.66	3.67
1980	9870	3440	13310	4955	1089	6044	4617	1034	5651	6.8	5.0	185	82	-2265	-2162	155	32	123	-2039	1799	2120	3851	1.64	2.14
1981	8200	3565	11765	4215	1136	5351	3918	1016	4934	7.0	10.6	131	71	-1724	-1670	158	33	125	-1545	765	1396	2467	1.66	3.22
1982	7651	3700	11351	4004	1184	5188	3749	985	4734	6.4	16.8	100	73	-576	-549	169	34	135	-404	839	1189	1898	1.42	2.26
1983	9359	3838	13198	4911	1236	6147	4554	1146	5700	7.3	7.2	95	74	1687	1708	173	35	138	1846	1294	2150	3580	1.66	2.77
1984	10042	3976	14017	5287	1283	6570	4913	1219	6132	7.1	5.0	131	81	633	683	173	36	137	820	1549	2572	4229	1.66	2.73
1985	12067	4115	16181	6378	1331	7709	5912	1264	7176	7.3	5.0	152	85	1958	2025	176	37	139	2164	2172	3609	6213	1.66	2.86
1986	12165	4259	16424	6486	1378	7864	5967	1309	7276	8.0	5.0	192	94	0	98	181	38	144	242	2237	3703	6505	1.66	2.91
1987	10298	4405	14703	5578	1438	7016	5243	1294	6537	6.0	10.0	203	97	-1973	-1867	185	39	146	1721	1777	2955	4599	1.66	2.59
1988	7630	4557	12187	4262	1499	5716	4029	1056	5085	5.5	29.6	156	94	-2730	-2668	192	40	152	-2516	900	1496	1888	1.66	2.10
1989	7632	4710	12342	4302	1566	5868	3984	1050	5034	7.4	33.0	89	88	0	1	194	41	153	154	862	1435	1844	1.67	2.14
1990	7639	4865	12504	4311	1619	5930	3907	1037	4944	9.4	35.9	98	90	0	8	196	42	154	162	804	1336	1804	1.66	2.24

Source: Mountain West Research, Inc., April, 1976.

TABLE A-16

ALTERNATIVE FUTURE 3
CONVERGING LABOR FORCE PARTICIPATION RATES

	Population			Labor Force			Employment			Unemployment Rate		Population Change								Change from Baseline				
												Anglo				Northern Cheyenne			Study Area					
Year	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Births	Deaths	Migration	Total Change	Births	Deaths	Total Change	Total Change	Δ Basic Emp	Δ Total Emp	ΔPop	ΔTE/ΔBE	ΔPOP/ΔBE
1971	5317	2536	7853	2298	716	3014	2145	660	2805	6.7	7.8	70	55	636	651	97	25	72	723	-	-	-	-	-
1972	5602	2611	8213	2420	747	3167	2265	707	2972	6.4	5.4	98	56	243	285	100	25	75	360	-	-	-	-	-
1973	8681	2694	11375	3939	788	4727	3716	748	4464	5.6	5.0	103	57	3034	3080	109	26	83	3163	-	-	-	-	-
1974	9664	2784	12448	4424	826	5250	4120	785	4905	6.9	5.0	145	67	904	982	116	27	89	1071	-	-	-	-	-
1975	8643	2879	11522	3986	865	4851	3731	822	4553	6.4	5.0	161	70	-1111	-1020	123	27	96	-924	-	-	-	-	-
1976	7675	2981	10656	3624	911	4535	3378	865	4243	6.8	5.0	121	67	-1007	-953	130	29	101	-867	11	-	-	-	-
1977	10231	3086	13317	4931	953	5884	4607	906	5513	6.6	5.0	97	65	2523	2555	135	30	105	2660	977	1623	3402	1.66	3.48
1978	11289	3197	14486	5492	985	6477	5113	936	6049	6.9	5.0	138	74	995	1059	142	31	111	1170	1522	2528	5283	1.66	3.47
1979	12445	3317	15762	6139	1038	7177	5726	986	6712	6.7	5.0	164	78	1070	1156	151	31	120	1276	1917	3186	6436	1.66	3.36
1980	10495	3440	13934	5271	1089	6360	4916	1034	5950	6.7	5.0	191	83	-2057	-1949	155	32	123	-1826	1455	2418	4475	1.66	3.07
1981	9029	3565	12594	4633	1136	5769	4313	1079	5392	6.9	5.0	144	79	-1530	-1465	158	33	125	-1340	1115	1853	3296	1.66	2.96
1982	8493	3700	12193	4430	1184	5614	4143	1063	5206	6.5	10.3	118	76	-578	-536	169	34	135	-401	1000	1661	2740	1.66	2.74
1983	10338	3838	14176	5410	1236	6646	5020	1174	6194	7.2	5.0	114	77	1807	-1770	173	35	138	-1632	1591	2643	4558	1.66	2.86
1984	10405	3976	14381	5495	1283	6778	5317	1219	6536	3.2	5.0	152	85	0	67	173	36	137	204	1792	2976	4592	1.66	2.56
1985	14350	4115	18465	7558	1331	8889	6960	1264	8224	7.9	5.0	163	87	3869	3945	176	37	139	4084	2804	4668	8496	1.66	3.03
1986	15641	4259	19900	8238	1378	9616	7629	1309	8938	7.4	5.0	231	102	1162	1291	181	38	144	1435	3229	5364	9982	1.66	3.09
1987	14635	4405	19040	7800	1438	9238	7311	1366	8677	6.3	5.0	265	108	-1162	-1005	185	39	146	-859	3066	5095	8936	1.66	2.91
1988	11448	4557	16005	6214	1499	7713	5853	1417	7270	5.8	5.5	244	108	-3324	-3188	192	40	152	-3036	2215	3681	5706	1.66	2.58
1989	10152	4710	14862	5673	1566	7239	5347	1319	6666	5.8	15.7	163	102	-1357	-1296	194	41	153	-1143	1845	3067	4363	1.66	2.36
1990	8456	4865	13321	4819	1619	6438	4533	1161	5694	5.9	28.3	140	101	-1735	-1696	196	42	154	-1542	1255	2086	2621	1.66	2.09

Source: Mountain West Research, Inc., April, 1976.

TABLE A-17

ALTERNATIVE FUTURE 4
CONVERGING LABOR FORCE PARTICIPATION RATES

Year	Population			Labor Force			Employment			Unemployment Rate		Population Change								Change from Baseline				
												Anglo				Northern Cheyenne			Study Area					
	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Births	Deaths	Migration	Total Change	Births	Deaths	Total Change	Total Change	Δ Basic Emp	Δ Total Emp	ΔPop	ΔTE/ΔBE	ΔPOP/ΔBE
1971	5317	2536	7853	2298	716	3014	2145	660	2805	6.7	7.8	70	55	636	651	97	25	72	723	-	-	-	-	-
1972	5602	2611	8213	2420	747	3167	2265	707	2972	6.4	5.4	98	56	243	285	100	25	75	360	-	-	-	-	-
1973	8681	2694	11375	3946	788	4734	3723	748	4471	5.6	5.0	103	57	3034	3080	109	26	83	3163	-	-	-	-	-
1974	9664	2784	12448	4432	826	5258	4127	785	4912	6.9	5.0	145	67	904	982	116	27	89	1071	-	-	-	-	-
1975	8643	2879	11522	3994	865	4859	3738	822	4560	6.4	5.0	161	70	-1111	-1020	123	27	96	-924	-	-	-	-	-
1976	7713	2981	10694	3643	911	4554	3396	865	4261	6.8	5.0	121	67	-984	-930	130	29	101	-829	11	18	38	1.64	3.45
1977	9562	3086	12648	4597	953	5550	4293	906	5199	6.6	5.0	99	65	1815	1849	135	30	105	1954	779	1309	2733	1.68	3.51
1978	10788	3197	13985	5247	985	6232	4890	936	5826	6.8	5.0	130	72	1169	1226	142	31	111	1337	1387	2304	4783	1.66	3.45
1979	12032	3317	15349	5933	1038	6971	5532	986	6518	6.8	5.0	157	77	1164	1244	151	31	120	1364	1799	2992	6023	1.66	3.35
1980	10359	3440	13799	5199	1089	6288	4850	1034	5884	6.7	5.0	185	82	-1776	-1673	155	32	123	-1550	1415	2352	4340	1.66	3.07
1981	8968	3565	12533	4587	1136	5723	4269	1079	5348	6.9	5.0	145	79	-1457	-1391	158	33	125	-1266	1088	1810	3235	1.66	2.97
1982	9013	3700	12713	4646	1184	5830	4231	1125	5356	8.9	5.0	121	76	0	45	169	34	135	180	1091	1812	3260	1.66	2.99
1983	10834	3838	14672	5610	1236	6846	5208	1174	6382	7.2	5.0	129	78	1769	1821	173	35	138	1959	1705	2832	5055	1.66	2.96
1984	10915	3976	14891	5703	1283	6986	5396	1219	6615	5.4	5.0	167	86	0	81	173	36	137	218	1840	3054	5102	1.66	2.77
1985	13714	4115	17829	7172	1331	8503	6627	1264	7891	7.6	5.0	177	88	2710	2800	176	37	139	2939	2373	4324	7860	1.66	3.31
1986	13844	4259	18103	7300	1378	8678	6857	1309	8166	6.1	5.0	229	99	0	129	181	38	144	273	2604	4593	8184	1.66	3.14
1987	12522	4405	16927	6702	1438	8140	6283	1366	7649	6.2	5.0	240	102	-1459	-1322	185	39	146	-1176	2449	4068	6823	1.66	2.79
1988	9354	4557	13911	5118	1499	6617	4825	1424	6249	5.7	5.0	210	101	-3277	-3169	192	40	152	-3017	1602	2660	3612	1.66	2.25
1989	8451	4710	13161	4768	1566	6334	4511	1487	5998	5.4	5.0	126	94	-935	-903	194	41	153	-750	1445	2399	2663	1.66	1.84
1990	8466	4865	13331	4781	1619	6400	4371	1538	5909	8.6	5.0	108	94	0	14	196	42	154	168	1386	1300	2631	.94	1.90

Source: Mountain West Research, Inc., April, 1976.

TABLE A-18

ALTERNATIVE FUTURE 5
CONVERGING LABOR FORCE PARTICIPATION RATES

	Population			Labor Force			Employment			Unemployment Rate		Population Change								Change from Baseline				
												Anglo				Northern Cheyenne			Study Area					
Year	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Total	Anglo	Northern Cheyenne	Births	Deaths	Migration	Total Change	Births	Deaths	Total Change	Total Change	Δ Basic Emp	Δ Total Emp	ΔPop	ΔTE/ΔBE	ΔPOP/ΔBE
1971	5317	2536	7853	2298	716	3014	2145	660	2805	6.7	7.8	70	55	636	651	97	25	72	723	-	-	-	-	-
1972	5602	2611	8213	2420	747	3167	2265	707	2972	6.4	5.4	98	56	243	285	100	25	75	360	-	-	-	-	-
1973	8681	2694	11375	3946	788	4734	3723	748	4471	5.6	5.0	103	57	3034	3080	109	26	83	3163	-	-	-	-	-
1974	9664	2784	12448	4432	826	5258	4127	785	4912	6.9	5.0	145	67	904	982	116	27	89	1071	-	-	-	-	-
1975	8643	2879	11522	3994	865	4859	3738	822	4560	6.4	5.0	161	70	-1111	-1020	123	27	96	-924	-	-	-	-	-
1976	7713	2981	10694	3643	911	4554	3396	865	4261	6.8	5.0	121	67	-984	-930	130	29	101	-829	11	18	38	1.64	3.45
1977	9562	3086	12648	4597	953	5550	4293	906	5199	6.6	5.0	99	65	1815	1849	135	30	105	1954	779	1309	2733	1.68	3.51
1978	10788	3197	13985	5247	985	6232	4890	936	5826	6.8	5.0	130	72	1169	1226	142	31	111	1337	1387	2304	4783	1.66	3.45
1979	12032	3317	15349	5933	1038	6971	5532	986	6518	6.8	5.0	157	77	1164	1244	151	31	120	1364	1799	2992	6023	1.66	3.35
1980	10359	3440	13799	5199	1089	6288	4850	1034	5884	6.7	5.0	185	82	-1776	-1673	155	32	123	-1550	1415	2352	4340	1.66	3.07
1981	8968	3565	12533	4587	1136	5723	4269	1079	5348	6.9	5.0	145	79	-1457	-1391	158	33	125	-1266	1088	1810	3235	1.66	2.97
1982	9013	3700	12713	4646	1184	5830	4231	1125	5356	8.9	5.0	121	76	0	45	169	34	135	180	1091	1812	3260	1.66	2.99
1983	10834	3838	14672	5610	1236	6846	5208	1174	6382	7.2	5.0	129	78	1769	1821	173	35	138	1959	1705	2832	5055	1.66	2.96
1984	10915	3976	14891	5703	1283	6986	5396	1219	6615	5.4	5.0	167	86	0	81	173	36	137	218	1840	3054	5102	1.66	2.77
1985	13714	4115	17829	7172	1331	8503	6627	1264	7891	7.6	5.0	177	88	2710	2800	176	37	139	2939	2373	4324	7860	1.66	3.31
1986	15873	4259	20132	8311	1378	9689	7688	1309	8997	7.5	5.0	229	99	2029	2159	181	38	144	2303	3265	5424	10213	1.66	3.13
1987	16038	4405	20443	8467	1438	9905	7986	1366	9352	5.7	5.0	273	109	0	165	185	39	146	311	3474	5770	10334	1.66	2.97
1988	18100	4557	22657	9558	1499	11057	8854	1424	10278	7.4	5.0	286	111	1887	2062	192	40	152	2214	4027	6689	12358	1.66	3.07
1989	14360	4710	19070	7698	1566	9264	7253	1487	8740	5.8	5.0	330	121	-3950	-3740	194	41	153	-3587	3095	5142	8572	1.66	2.77
1990	10870	4865	15735	5997	1619	7616	5618	1538	7156	6.3	5.0	224	113	-3600	-3489	196	42	154	-3335	2136	3547	5035	1.66	2.36

Source: Mountain West Research, Inc., April, 1976.

TABLE A-19

PER CAPITA NON-AGRICULTURAL LABOR INCOME
(thousands of constant 1973 dollars)

	Baseline		Alternative Future 1		Alternative Future 2		Alternative Future 3		Alternative Future 4		Alternative Future 5	
Year	Anglo	Northern Cheyenne	Anglo	Northern Cheyenne	Anglo	Northern Cheyenne	Anglo	Northern Cheyenne	Anglo	Northern Cheyenne	Anglo	Northern Cheyenne
1973	2863	1369	2863	1369	2863	1369	2863	1369	2863	1369	2863	1369
1974	3014	1440	3014	1440	3014	1440	3014	1440	3014	1440	3014	1440
1975	2918	1517	2918	1517	2918	1517	2918	1517	2918	1517	2918	1517
1976	2800	1536	2800	1536	2810	1538	2800	1558	2810	1538	2810	1538
1977	2653	1389	3207	1604	3242	1609	3344	1617	3242	1609	3242	1609
1978	2465	1186	3413	1633	3449	1636	3501	1640	3449	1636	3449	1636
1979	2176	1150	3631	1704	3653	1704	3692	1710	3626	1805	3626	1805
1980	2475	1114	3423	1744	3508	1754	3593	1755	3513	1938	3513	1938
1981	2605	1082	3173	1461	3341	1633	3496	1785	3369	2043	3369	2043
1982	2605	1049	3077	1273	3346	1500	3611	1681	3313	2090	3313	2090
1983	2601	1015	3086	1231	3657	1803	3781	1869	3709	2087	3709	2087
1984	2594	985	3090	1195	3792	1895	4059	1901	3860	2127	3860	2127
1985	2585	958	3090	1159	4016	1935	4131	1942	4000	2171	4000	2171
1986	2681	932	3258	1125	4039	1955	4236	1969	4136	2205	3937	2212
1987	2672	907	3257	1097	4043	1851	4311	2008	4066	2348	3269	2364
1988	2662	882	3249	1064	3753	1344	4208	2021	3784	2495	4248	2539
1989	2651	859	3240	1034	3686	1288	4208	1775	3832	2499	4216	2547
1990	2637	836	3228	1006	3576	1223	4023	1441	3654	2524	4020	2554

Source: Mountain West Research, Inc., April, 1976.

APPENDIX B

CENSUS SUMMARY AND RECONCILIATION

This section will give a brief description of the population changes that have occurred since 1970 as indicated by the January 1976 Special Census. The first part will explain the coding system for the areas of the county used by the Bureau of the Census, and then each of the major areas will be analyzed. The final part will reconcile the Special Census population for the county with that projected by the model.

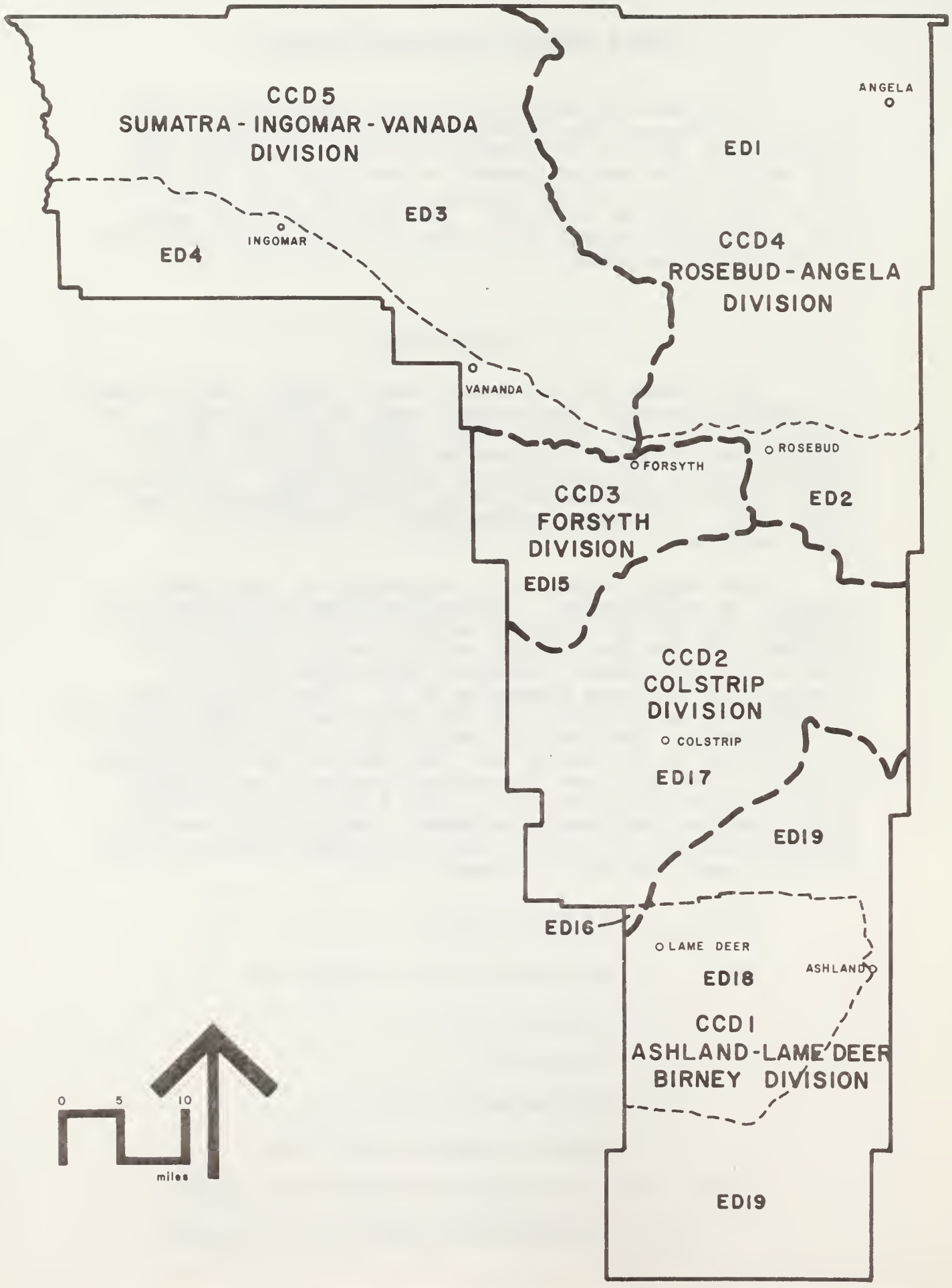
I. CODING SYSTEM

The Bureau of the Census uses a rather simple system for keeping track of the various areas of the county. The largest area is the county level. The next level of disaggregation is called the Census County Division (CCD). Rosebud County includes five of these regions. The smallest level used for the Special Census is the enumeration district (ED). In Rosebud County, CCD is composed of at least two EDs.

The map in Figure B-1 indicates the approximate location of these areas. The Ashland-Lame Deer-Birney CCD includes all of the southern portion of the county and is divided into two EDs. ED 18 encompasses all of the CCD that is on the Northern Cheyenne Reservation with the remainder of the area composing ED 19. The Colstrip CCD includes the central part of the county and is composed of ED 17 and ED 16. The town of Forsyth is in the Forsyth CCD and includes ED 5-9 and ED 13. The rest of the Forsyth CCD is ED 15. The last two CCDs--Rosebud-Angela and Sumatra-Ingomar-Vanada divisions--are quite large and include ED 1-4 as well as the town of Rosebud. Besides the numerical designations (ED 2) for the EDs, the summary tables for the Special Census use the following:

Area	545:	Rosebud County
MCD	5:	Ashland-Lame Deer-Birney CCD
	10:	Colstrip CCD
	15:	Forsyth CCD
	20:	Rosebud-Angela CCD
	25:	Sumatra-Ingomar-Vanada CCD
Place	0:	Unincorporated areas of the county
	250:	Incorporated areas--city of Forsyth

FIGURE B-1
ROSEBUD COUNTY CENSUS DIVISIONS



The summary data for the county and areas are given in Table B-1. The populations for each ED in 1970 and 1976 are compared in Table B-2. Note the change in numbering of the EDs for 1976. Following is an area-by-area analysis of the population change.

II. ASHLAND-LAME DEER-BIRNEY CCD

The Ashland-Lame Deer-Birney CCD showed a net gain of 277 between 1970 and 1976; 49 were white and 228 were non-white. The gain of 228 is not surprising given the large natural increase of the Northern Cheyenne population.

When the two EDs are broken out, ED 19 (ED 9 in 1970), which includes the area around the reservation, had a net gain of 392 composed of 133 white and 259 non-white. ED 18 (ED 10 in 1970), which contains most of the reservation, showed a net loss of 115. This included a loss of 84 whites and 31 non-whites. The loss of 84 whites is not so much a mystery as the loss of 31 Northern Cheyennes from the reservation. One would expect a net gain of over 200 due to the natural increase of the Northern Cheyenne population. Two explanations are possible. The first is that the Bureau of the Census could have undercounted the Northern Cheyenne population. Although many feel that this is true, there is no reason to expect the undercounting to be greater in 1976 than it was in 1970. The second, and more likely reason, is that many of the Northern Cheyennes have moved from the reservation proper and are now living around it. This explanation is supported by the fact that the natural increase for both EDs combined is close to what would be expected.

III. COLSTRIP DIVISION

The Colstrip CCD showed the most growth compared to any of the others; as a result of Colstrip 1 and 2, it grew by 2260 persons during the period. All of this occurred in and around the town of Colstrip. Estimates of the population of the town in 1970 were 200, meaning that approximately 222 persons lived in other areas of the CCD. If we assume that this has not changed appreciably, then the population of Colstrip in January of 1976 was 2460. This has declined since January and will continue to decline until the construction phase of the project is completed.

TABLE B-1

ROSEBUD COUNTY POPULATION, SPECIAL CENSUS

Area	Total Population			White Population			Non-White Population		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Rosebud County	9578	5121	4457	7429	4030	3399	2149	1091	1058
Ashland-Lame Deer CCD	2912	1481	1431	873	444	429	2039	1037	1002
ED 18	1966	1013	953	222	119	103	1744	894	850
ED 19	946	468	478	651	325	326	295	143	152
Colstrip CCD	2682	1570	1112	2594	1528	1066	88	42	46
ED 16	23	12	11	1	1	0	22	11	11
ED 17	2659	1558	1101	2593	1527	1066	66	31	35
Forsyth CCD	3044	1569	1475	3024	1558	1466	20	11	9
ED 5	2	1	1	2	1	1	0	0	0
ED 6	7	3	4	7	3	4	0	0	0
ED 7	852	413	439	852	413	439	0	0	0
ED 8	277	137	140	270	133	137	7	4	3
ED 9	14	8	6	14	8	6	0	0	0
ED 13	1297	677	620	1290	673	617	7	4	3
ED 15	595	330	265	589	327	262	6	3	3
Rosebud-Angela CCD	605	312	293	605	312	293	0	0	0
ED 1	186	95	91	186	95	91	0	0	0
ED 2	419	217	202	419	217	202	0	0	0
Sumatra-Ingomar CCD	335	189	146	335	189	146	0	0	0
ED 3	145	84	61	145	84	61	0	0	0
ED 4	190	105	85	190	105	85	0	0	0
Forsyth	2449	1239	1210	2435	1231	1204	14	8	6
Unincorporated Areas	7129	3882	3247	4992	2799	2195	2135	1083	1052

Source: U.S. Bureau of the Census, Special Census for Rosebud County, unpublished data.

TABLE B-2

POPULATION CHANGE, 1970-1976

1970 ED	1976 ED	1970	1976	Change	Change	CCD
1	1	135	186	51	37.8	Rosebud-Angela CCD
2	2	328	419	91	27.7	
3	3	156	145	-11	-7.0	Sumatra-Ingomar-Vanada CCD
4	4	200	190	-10	-5.0	
5,6	5-9,13	1873	2449	576	30.7	Forsyth CCD
7	15	283	595	312	110.2	
8	16,17	422	2682	2260	535.5	Colstrip CCD
9	19	554	946	392	70.7	Ashland-Lame Deer-Birney CCD
10	18	2081	1966	-115	5.5	
County		6032	9578	3546	58.8	

Source: U.S. Bureau of the Census, Census of Population: 1970: Montana (Washington, D.C.: U.S. Government Printing Office, 1973).

IV. FORSYTH DIVISION

Growth in the CCD was split between the town of Forsyth and the rural areas south and west. Forsyth itself grew by 576 persons, or 30.7 percent, between 1970 and 1976. The rest of the area grew by 312 persons, giving the entire CCD an increase of 888 persons, or 41 percent. The number of housing units in the town increased to 928 from its 1970 level of 768, which is a rise of 160. The average number of persons per household increased from 2.65 persons in 1970 to 2.72 in 1976.

Much of the increase in the population can be attributed to activity in the Colstrip area but also to the increase in railroad activity in Forsyth. As the construction activity for Colstrip units 1 and 2 slows, Forsyth's population should fall from this level.

V. ROSEBUD-ANGELA DIVISION

The Rosebud-Angela CCD is composed of two EDs. ED 1 is the area north of the Yellowstone River in the eastern part of the county. ED 2 encompasses the area east of Forsyth and south of the river which includes the town of Rosebud. ED 1 had an increase of 51 in population while ED 2 increased by 91 persons. The growth in ED 2 occurred around the town of Rosebud, causing the population of this town to increase from 225 to 316 in 1976.

VI. SUMATRA-INGOMAR-VANADA DIVISION

This CCD was the only one to decline in population and dropped to a level of 335 for a loss of 21 since 1970. The decline was evenly distributed between the two EDs. The cause of this decline was the lack of new job opportunities in the region.

VII. RECONCILIATION OF MODEL PROJECTION WITH 1976 SPECIAL CENSUS

Four adjustments must be made to the population projection of the model before it can be compared to the 1976 Census total. The first is the Anglo unemployment rate that was projected for the county. If this rate is higher than was actually the case when the census was taken, the labor force and population projection for the county would be higher than it would be if the projected unemployment rate were the actual rate. Since no current estimate of the unemployment rate is available, a rate that is reasonable has to be assumed. Since the 1970 Anglo rate was 2.0 percent for the county and since unemployment has surely increased, we have assumed a five percent unemployment rate for the adjustment process.

The second adjustment necessary was to account for the difference in the number of construction workers at Colstrip assumed in the model and the actual number employed at the time of the Special Census. In January there were approximately 750 workers which, when adjusted for residentiary patterns, gives 588 workers or 112 more than was assumed in the model for 1976.

Third, since the Special Census was taken close to the mid-point of the projection period, only half of the natural increase between 1975 and 1976 will be added to the 1975 population.

Table B-3 gives the step-by-step adjustment process. Line 4 shows the labor force if the 5.0 percent, rather than the 6.8 percent, unemployment rate is assumed. The difference between this and the projected level, -68, is then multiplied by the ratio of population to labor force. This gives a difference of -144 in the population of the study area if the lower unemployment rate is assumed.

The next step is to adjust for the difference in the number of construction workers in the county. The CWP survey found that there was an average of 2.36 persons for every construction worker at Colstrip, and using this gives a population difference of 264, Line 13. Since the number of construction workers in January was higher than the number assumed in the model, the 264 was added to the population in Line 8.

The next adjustment is to account for the induced workers who would be associated with the change of 112 construction workers. Using the implied multiplier in the model of .66 induced workers per construction worker and the ratio of population to labor force of 2.12 yields an induced population change of 157. This is then added to the population in Line 16, giving a total of 7925 persons in the study area.

One-half of the natural increase of the Anglo population along with the number of Anglos in the Busby-Decker CCD in Big Horn County are subtracted from the population of Line 19. The final adjusted Anglo population of 7568 in Rosebud County, Line 22, is 139 greater than the Special Census number of 7429, or a 1.87 percent difference.

The process for adjusting the Northern Cheyenne population is somewhat more simple. One-half of the natural increase in the population is subtracted from the projected Northern Cheyenne population. After accounting for the Northern Cheyennes living in the Busby-Decker CCD, the projected population is 2163 compared to the Special Census count of 2149, which is a difference of .6 percent.

The combined, adjusted population of 9731 is 153 above the Census count of 9578. This is a difference of only 1.6 percent.

TABLE B-3

RECONCILIATION OF POPULATION

(1)	Projected 1976 Anglo Population	7675
(2)	Projected 1976 Anglo Labor Force	3624
(3)	Projected 1976 Unemployment Rate	6.8%
(4)	Anglo Labor Force with 5 Percent Unemployment	3556
(5) = (4)-(2)	Difference in Labor Force	-68
(6)	Population: Labor Force Ratio	2.12
(7) = (5)x(6)	Population Difference	-144
(8) = (1)+(7)	Adjusted Anglo Population	7531
(9)	Construction Workers (CW) in Model	450
(10)	Actual CW (adjusted)	562
(11) = (10)-(9)	Difference in CW	112
(12)	Population per CW	2.36
(13) = (12)x(11)	Population Difference	264
(14) = (8)+(13)	Adjusted Anglo Population	7795
(15)	One-half of Natural Increase 1975-1976	27
(16) = (14)-(15)	Adjusted Anglo Population	7768
(17)	Induced Workers per CW	.66
(18) = (11)x(17)	Induced Workers Associated with CW	74
(19) = (18)x(6)	Induced Population	157
(20) = (16)+(19)	Adjusted Anglo Population	7925
(21)	Anglos in Busby-Decker CCD in Big Horn County	357
(22) = (20)-(21)	Final Adjusted Anglo Population	7568
(23)	1976 Special Census Anglo Population	7429
(24)	Estimated Percentage Error of Population Projection	1.87%
(25)	Projected 1976 Northern Cheyenne Population	2981
(26)	One-half of Natural Increase 1975-1976	51
(27) = (25)-(26)	Adjusted Northern Cheyenne Population	2930
(28)	Northern Cheyennes Living in Busby-Decker CCD	767
(29) = (27)-(28)	Projected Northern Cheyenne Population	2163
(30)	1976 Special Census Northern Cheyenne Population	2149
(31)	Estimated Error of Population Projection	0.65%
(32)	Adjusted Projected Population of Rosebud County	9731
(33)	1976 Special Census Population	9578
(34)	Estimated Error of Projected Population	1.60%

Source: Mountain West Research, Inc.